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Initialled abstracts and reviews not by Bureau staff are by H. W. B. Barlow, A. H. M. Kirby, D. S. Kirkham, D. H. Maggs, H. B. S. Montgomery and W. A. Roach of the East Malling Research Station and G. St.C. Feilden.

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EDITORIAL NOTES

Conference.

Delegates to the Quinquennial Conference on the Commonwealth Agricultural Bureaux spent a useful June examining the works of this and other bureaux. No change in *Horticultural Abstracts* is contemplated.

Subscriptions.

Our pious hope expressed earlier this year of enrolling our 1,000th subscriber has now been fulfilled. Since, however, the no less laudable desire of printers for a little more pay has also recently been granted, our second hope of parity with printing costs still dangles like an elusive carrot before our twitching nostrils. A decrease in subscription rate is not imminent.

Bibliographies.

Considerable use has been made of our offer in the March number to provide bibliographies and notes. Between the end of March and 16 July we have been able to fulfil all requests for such compilations. So far 191 copies of 21 items have been sent out.

SALIENT ITEMS. Vol. 25. No. 3.

GROWTH AND PHYSIOLOGY.

Root growth:—In tomatoes root growth ceased within 4 weeks of planting and was renewed after harvest (2953). It would be of interest to know if phasic development of this type, known to occur in perennials, is also a general phenomenon in annuals. A close relationship established between photosynthesis and the rate of root growth in maples is also of interest (2332).

Temperature responses:—There is a series of papers (2446-2448) on the effects of temperature and other climatic factors on the times of blossoming and fruit ripening in apples and peaches. A study on beetroot suggests that low temperature induces a vernalizing effect but that day-length is the factor which allows the effect to be realized (2331).

Light responses:—It is suggested that photoperiods induce flower formation as a result of a balance between the products of photosynthesis and auxin (2339). Certainly the organic acids and carbohydrates are influenced by day-length (2340, 3133) as is enzyme activity (3335). The stimulus, so far as flower induction is concerned, however, may be limited to a single branch to which the appropriate photoperiodic treatment has been applied (3048). Four other papers (2343-2345, 2870) contribute basic information on the responses of plants to different types of light.

Wind responses:—The effect of wind on the transpiration of plants varies with species and in some cases with light intensity (2322).

Growth substances:—An auxin gradient theory is advanced to explain how abscission is controlled (2356). Among many other papers on growth substances mention may be made of two on adenine and other substances as growth stimulants (2354, 2848), two on auxin antagonists, both natural and synthetic (2351, 2352), and one on the nature of the time lag in auxin-induced water uptake (2353).

Induced juvenility:—In raspberry suckers with basal crown galls (2524).

MACHINERY AND EQUIPMENT.

Machines and implements:—Items described include a tractor for nursery work (2403), an electric buzzer for sowing small seeds (2404) and a precision drill for sowing apple seeds (2433), a mower for cutting back tree tops (2487), a so-called steel squirrel, with a crow's nest, which hastens pruning and picking operations in orchards (2489), a grape harvester enabling one man to deal with 100 tons per day (2561), a tung harvester (3240), a ratoon-shaver for sugar cane (3347), an arched boom for spraying bush fruits (2724), a mobile orchard heater (2600) and a rotary grader for hemp seeds (3047). The results obtained so far with hop picking machines in England are summarized (3053).

Apparatus:—These include devices for sterilizing trays (2405), fumigating tobacco under vacuum (3024), and for measuring soil moisture (2406), plant populations (2407), photosynthesis (2408), plant growth increments (2409) and temperatures (2410). Mention may also be made of a drop valve which, fitted to a planting machine, supplies measured amounts of liquid to each plant (2837).

Glasshouses and frames:—The term glass may be something of a misnomer in view of the increasing use being made of plastic and other substitutes (2395-2399). Glass is still being used in two new mobile houses (2392, 2393), in mobile double-span Dutch lights (2400) and in a house with a double roof (2394). Adhesive strips are now available as a substitute for putty (2401).

PACKING AND STORING FRUIT AND VEGETABLES.

Packing:—The use of coloured lights in grading, conventional and unconventional methods of packing and transport, methods of cooling packed produce and the economics of different operations are variously dealt with in a series of papers on deciduous fruits (2497-2502), grapes (2562), oranges (3219) and lettuces (2940). Information is even given on methods of keeping track of the whereabouts of empty field boxes (2503) and on ways of affixing labels (2504).

Storage:—A general account of storage methods used in the Californian citrus industry is noted (3241z). Plastic wraps, bags and liners continue to arouse interest (2508-2510, 2941, 3220). Keeping quality in fruits may be enhanced by ultraviolet irradiation (2346). Decay in citrus fruits can be reduced by chemical dips followed by cooling (3222) or by ammonia gas (3223), brown rot in peaches by the antibiotic candicidin (2646) and rots in spinach by the better known antibiotic streptomycin (2941). Jack fruit devotees will be glad to hear that this fruit will keep for up to 6 weeks in cool storage and for much longer when sliced and frozen stiff in syrup (3365).

PLANT NUTRITION.

Plant analysis:—The use of plant analysis as a guide to nutrient status was one of the subjects discussed in a symposium organized as part of the 8th Botanical Congress in Paris. The crops considered included vines (2548), citrus (3183, 3184), tung (3239), coconuts (3270), coffee (3370g), oil palms (3301) and sugar cane (3330). Among many other papers providing information on this subject, mention may be made of one which reports that diseased areas of leaves show selective accumulation of various elements (2369), and another which describes the use of rapid tissue tests for surveying the nutrient status of sugar cane crops (3328). An American committee urges workers on mineral nutrition to express their data not only on the traditional weight basis but also in terms of molar and equivalent concentrations (2380).

Foliar application:—Responses obtained from sprays of N, P, K or Mg are described for various fruits (2476-2478, 2549), vegetables (2810, 2926, 2935) and coffee (3277). With tobacco the uptake of P was increased by scratching the leaves with carborundum (3015). With oil palms an attempt to apply P through leaf axils met with little success (3302). A possible objection to the use of some common fertilizers as sprays is that they may poison bees (2371).

Boron:—This element is back in the limelight with papers on its availability in soil (2925) and its effects on disorders of pears (2582) and citrus (3192) and on nicotine formation in tobacco (3016). With tomatoes grown in soilless culture increases in the B concentration of the solution may be beneficial or harmful without any deficiency or toxicity symptoms being apparent (2962). In vineyards over-enthusiastic correction of B deficiency may, however, be disastrous (2583).

Iron:—Several papers (2585-2587, 3155, 3194, 3195, 3278) provide information on lime-induced and iron-deficiency chlorosis without contributing anything fundamentally new. Possible exceptions are the discovery that iron-deficient leaves accumulate free arginine (2362) and that in vines lime-induced chlorosis may not only reduce shoot and leaf growth but may also cause delayed foliation and reduced pollen viability (2588).

Other elements:—Studies concerned with single elements relate to aluminium (3356), calcium (2584), chlorine (2376), copper (3316, 3357), manganese (2587, 2589, 3358), molybdenum (2827-2830) and zinc (2475, 2963, 3333). More complex are papers on the interrelationships between phosphorus and other elements (3065, 3189), between sodium and calcium (3191) and molybdenum and nitrogen (2374). And if further complexity be needed attention might be turned to the role of phosphorus in the water relations of tomato plants (2961).

Toxicities:—A further paper on the aftermath of the Dutch sea water floods (2816) can well be supplemented by examining an American paper which shows that salinity hazards can be reduced by modifying bed shapes and cultural and irrigation practices (2815). There is further evidence that citrus does not like biuret (3188) or fluorides (3193).

PLANT PROPAGATION.

Seed:—The grading of seed by weight is shown to increase the uniformity of pome fruit seedling rootstocks (2433). The length of dormancy, however, depends on several other factors (2434). The germination of various vegetable seeds can be improved, under some conditions, by treatment with fungicides and insecticides (2805, 2860, 2893, 2932, 2942), that of walnut seeds by treatment with radioactive cobalt (2572), and that of tomato seeds by low temperature treatment (2954). X-rays did not, however, stimulate germination in lettuce and cabbage seeds (2389). Recommended treatments for the seeds of a large number of ornamental shrubs may also be mentioned (3139), as can the failure of several alkaloids to stimulate the germination of tobacco seeds (3004) and of attempts to find a better medium on which to germinate vanilla seeds (3027). On the subject of storage three papers relating to tobacco and other tropical plants may be noted (3012, 3237, 3245). Two other papers (2806, 2807) are concerned with the paper used for seed packets, including those brightly coloured packets which in some parts of the world herald the spring.

Cuttings and marcots:—Attention should be drawn to a useful Dutch booklet on the propagation of trees and shrubs from cuttings (3140). Results obtained with mist propagation are reviewed in three papers (3072-3074), and in a fourth (3162) an account is given of a modified technique in which the basal ends, and not the tops, of the cuttings were held in the mist chamber. The rooting of cuttings may be affected by the source of the material used (2444), by storing the material for several weeks before planting (2445) and by supplementary light (3145), as well as by the more generally recognized growth substance treatments (3149, 3156, 3179). Other papers deal with the water relations of unrooted cuttings (3150), methods of handling tea cuttings for despatch by mail (3354), an unsuccessful attempt to strike sapodilla cuttings (3367) and the marcotting or air-layering of several crops (3141, 3180, 3294, 3364).

Grafting:—New methods of propagating walnuts are described using a flap patch bud (2573) and a soft wood splice graft (2574). Castor bean plants can be grafted in the cotyledonary stage (3064). In bench-grafted vines the medium used for stratification can affect the union (2543) and in mangoes the method of grafting employed can affect the rate of loss of water from the young plants (3295). A serious attempt in Germany to produce graft hybrids in tomatoes, using Russian techniques, proved unsuccessful (2944).

Transplanting:—Methods of packing nursery plants are reviewed (3077). Tomato plants can be shipped, bare-root, in ventilated polyethylene bags or in crates lined with this material (2986). Strawberry plants can be held in cold storage for 6 months with little effect on their subsequent performance (2534).

SURVEYS, SELECTION AND STATISTICS.

Surveys:—A system adopted for surveying Californian orange groves, with particular reference to tree health, should be of fairly general interest (3175).

Plant selection:—Statistical aspects of plant selection are dealt with in one paper (2319) and of yield computation in sugar cane variety trials in another (3321).

Plant variation:—Most people faced with the problem of laying out field experiments would welcome guidance on plot size in relation to plant variation (2443, 3275). Unfortunately this is not the whole story, because account must also be taken of plot shape (3353) and methods used in transplanting (3005).

Soil pests:—A method of obtaining more accurate results in soil insecticide trials is described (3022).

WEED CONTROL.

Herbicide fashion notes:—Among the newer herbicides dalapon catches the eye as an up-and-coming destroyer of grasses, especially in tree and small fruit plantations (2742, 2752, 2756, 2760-2762, 2774). Possibly worth watching are various phenoxy butyric acid compounds (2785, 2790). Among the old stagers 2,4-D can be given a new look and made more persistent by the addition of sodium borate (2789).

Killing two birds, etc.:—Kerosene (paraffin) used to control weeds in cranberries has also given very good control of several insect pests (2719) and dinitro compounds have controlled rust on mint as well as weeds (3044).

Timing herbicide applications:—Evidence that 2,4-D is most effective against thistles when their carbohydrate reserves are at their lowest provides food for thought (2746).

MISCELLANEOUS.

Atomic energy:—All its non-explosive agricultural uses are surveyed (2388).

Birds:—Callous fruit growers, who do not regard birds as their feathered friends, may conceivably feel disposed to try the effect of distress calls (2710) or of poisoned wheat dyed blue (2711).

Other pests:—Two N-substituted formamides killed every insect and mite they were used against (2718). The use of a synthetic lacquer preparation containing dieldrin has shown exceptional persistence (3282). A new nematocide, 1,2-dibromo-3-chloropropane, has proved much more lethal than standard fumigants and in addition is not injurious to some established tree crops (2668).

Pollination:—Naphthaleneacetamide applied to petal wounds has resulted in seed formation in normally unsuccessful crosses between tetraploid Easter lilies (3116).

Viruses:—The promise shown in earlier studies by colorimetric methods to diagnose virus diseases has not been realized (2606, 2623). To avoid ending on this gloomy note it may be mentioned that just occasionally it is possible to keep one step ahead of a virus (3106).

MISCELLANEOUS.

General.

(*See also* 3382, 3387-3389, 3392, 3401, 3402, 3408e k, n, r.)

2315. United States Department of Agriculture.
Directory of organisation and field activities of the Department of Agriculture, 1955.
Agric. Handbook U.S. Dep. Agric. **76,** 1954, pp. 198, 55 cts.

The directory shows the organization of the department, explains the multiple activities of its agencies and offices, gives their locations within and outside the continental United States and lists the supervisory and research staff.

2316. Banga, O.
The Institute of Horticultural Plant Breeding [Wageningen]. [Dutch summary.]
Euphytica, 1955, **4**: 7-14, illus.

The general organization of the Institute is surveyed, and the various lines of research are described.

2317. UNESCO Centro de Cooperación científica para America Latina.
Institutiones científicas y científicos Latinoamericanos. (**Scientific institutions and scientists in Latin America.**)
[*Mimeo. Publ.*] *UNESCO Centro de Cooperación científica para America Latina*, 1954, pp. 201, being *America Central*, Vol. I.

Annotated lists are given for Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama. An index of the branches of science covered by the scientists is given as an appendix.

2318. Danish Agricultural Organisations.
Danish Agriculture. Denmark as a food producer.
Danish Agricultural Organisations, Copenhagen, 1954, $7\frac{1}{2} \times 5$ in., pp. 94, illus.

The story of Danish farming and food production, including a chapter on apple growing.

2319. Keuls, M., and Sieben, J. W.
Two statistical problems in plant selection. [Dutch summary.]
Euphytica, 1955, **4**: 34-44, bibl. 11.

The effect on selection produced by inherited variation combined with variation caused by environmental conditions is set out in detail. The authors discuss 2 methods for adequately efficient selection under these conditions. A method is given for obtaining a selection level following a "minimum risk approach".

2320. Furnival, G. M.
Study cold-soaking treatment of posts of Delta hardwoods.
Miss. Fm Res., 1954, **17** (8): 5, illus.

Tests were made at the Delta Branch of the Southern Forest Experiment Station, Miss., to determine whether fence posts cut from various hardwood species could be treated satisfactorily by cold-soaking in pentachlorophenol. Eleven species were cut and peeled in March, seasoned during the summer and treated in early autumn by soaking horizontally for 5 days in a 5% solution of pentachlorophenol in diesel oil. A study of the penetration of the preservative showed that good results could be expected from red oak, overcup oak, cedar elm, bitter pecan and privet, and a substantial increase in service life could be expected from hickory and American elm. Unsatisfactory results were obtained with tupelo and boxelder.

Climate and weather.

2321. de Villiers, G. D. B.
A ten-year summary of the climatological data recorded at the Agro-meteorological Observatory, Groot Drakenstein. (1941 to 1950.)
Sci. Bull. Dep. Agric. S. Afr. **349,** being *Fruit Res. tech. Ser.* **36,** 1954, pp. 39, bibl. 7, illus.

The area served by the Western Province Fruit Research Station borders on the sub-tropical, hence the absence of sufficient cold is sometimes an important factor influencing fruit production. Climatic data at the observatory have been supplemented since their first recording in 1941 by observations on blossoming, leafing, fruit-setting, shoot and fruit growth production, fruit bud differentiation and leaf-fall. This bulletin, however, deals only with the meteorological data for the years in question. They cover mean monthly maximum and minimum air temperatures, average mean air temperatures, variations in temperature, ground temperatures, humidity and rainfall, air movement, evaporation, sunshine, soil temperature, and dew.

2322. SORIANO, A.
Observaciones experimentales sobre el efecto del viento en las plantas. (**Experiments on the effect of wind on plants.**)
Rev. Invest. agric. B. Aires, 1953, **7**: 253-75, bibl. 6, illus.

In transpiration studies *Nicotiana glauca*, *Bryophyllum calycinum*, *Larrea tridentata* and other plants were exposed to winds of 14 and 33·5 km. per hour and light intensities of 480 and 1,000 f.-c. Only the 3 species named withstood the treatment well. In the case of *N. glauca* (1) plants exposed for some time to wind transpired more than newly exposed plants; (2) the transpiration rate of plants removed for a short period from calm into a wind or vice versa depended on the light intensity in which they had been grown; (3) high wind reduced growth. In the case of *L. tridentata* and *B. calycinum* (1) plants exposed for some time to wind transpired less than newly exposed plants, the rate of transpiration decreasing with increased length of treatment; (2) there was a correlation between reduction in transpiration and increase in leaf area; (3) light intensity had little influence on transpiration in *B. calycinum*, whereas in *L. tridentata* the effect of wind varied considerably according to whether the plants had been grown under 480 or 1,000 f.-c.

2323. MINISTRY OF AGRICULTURE, LONDON.
A survey of the agriculture of the sand lands in districts of low rainfall.
Bull. Minist. Agric. Lond. **163**, 1954, pp. 49, map, 2s. 6d.

The main object of this survey was to examine and describe the agricultural circumstances and farming (including market gardening) systems of the sand land areas in districts with rainfall of less than 30 in. a year, special attention being paid to the chief problems encountered in the different areas. The areas considered include the Yorkshire and Lancashire, East Midland, West Midland, South-eastern and Eastern provinces. It is felt that sufficient knowledge and experience is available to make possible the reclamation of sand lands at present out of cultivation, as well as to increase production of much land already under cultivation.

2324. MASON, B. J.
Design and evaluation of large-scale rain-making experiments.
Nature, 1955, **175**: 448-51, bibl. 7.

The present scientific status of rain-making experiments is discussed with special reference to the execution and evaluation of a large-scale trial proposed under British conditions.

2325. DOUGLAS, R. H.
A statistical analysis of the results of cloud-seeding in Quebec, 1951 and 1952.
Circ. meteor. Div. Dep. Transport Canada **2536 TEC 193**, 1954, pp. 21+18 charts.

During the autumn and early winter of 1951 and 1952 cloud-seeding was carried out over 2 large watersheds in Quebec. Results are analysed and compared with those of other independent analyses. During five of the six months in which seeding was performed, marked deficits in rainfall were observed over one watershed. Due to abnormalities in the overall precipitation patterns, however, there is a reasonable doubt that these deficits were caused by seeding. There is little firm evidence to support the conclusion that the increase in precipitation during one month was due to seeding.

2326. AMERICAN METEOROLOGICAL SOCIETY.
Statement on weather modification.
Bull. Amer. meteor. Soc., May 1953, 1 p. [received in typescript].

A very brief statement is given of what is likely to occur in clouds following seeding with dry ice crystals or silver iodide. Evidence of positive results from silver iodide seeding is not yet so convincing as that following dry ice seeding. The release of substantial amounts of precipitation by either natural or artificial means needs the pre-existence of an extensive moisture supply in the form of moist air currents and of active cloud-forming processes. Hence the meteorological conditions favourable for the artificial release of precipitation are much the same as those which usually lead to natural release of precipitation. While studies do not preclude the possibility of increasing precipitation by ground based silver iodide seeding, they suggest that any increase induced has been relatively small.

2327. ARCHER, T. K.
Rockets and hail.
Stanthorpe Border Post [*Qd*], 10 and 15 Feb. 1955.

This is a report on observations made on attempts to prevent hail damage by means of rockets. The author records what happened visually and what may have been the cause. [The author, who is secretary of the Stanthorpe District Hail Prevention Committee, Applethorpe, South Queensland, Australia, is anxious to hear from others who have worked with the same or similar preventive methods.]

2328. HOWE, G. M.
Soil-warmth in sunny and shaded situations.
Weather, 1955, **10**: 49-52.

Graphs are presented showing soil temperatures at a depth of 2 in. in sunny and shaded situations in bare, medium-brown, stony, clayey loam. Diurnal temperature fluctuations were very much less in the shaded soil than in the soil in the sunny situation. In fair, dry weather in April, the average maximum temperature of the shaded soil was only 2° F. higher than the average minimum temperature of the soil in the sunny situation, and 18° F. lower than the maximum.

2329. BOBROV, R. A.
Use of plants as biological indicators of smog in the air of Los Angeles County.
Science, 1955, **121**: 510-11, bibl. 15, illus.

The effect of artificially induced smog was studied on several monocotyledons and dicotyledons which had been grown in smog-free conditions. The first visible response in the leaves was a shiny waterlogged appearance of the lower surface. Epidermal cells closest to the stomata swelled, and stomatal apertures enlarged as the guard cells expanded. The entire leaf became turgid. The cells lining the substomatal chamber were the first to show protoplasmic injury. Chloroplasts disintegrated and plasmolysis followed; cell walls shrank slowly and intercellular air spaces enlarged. Cellular "mummification" was not complete until 1–2 days after exposure. Damage produced by smog differs from that caused by other phytotoxic agents in that the cells shrink and are not disrupted. The anatomy of stems, roots and leaf vascular tissue was not affected, indicating that no translocation had taken place. Of the plants studied *Poa annua* is considered to be a particularly reliable indicator for smog and further studies are in progress on its use for this purpose.—Univ. Calif., Los Angeles.

2330. Webber, E. R.
Aircraft in agriculture.
New Commonw., 1955, **29**: 336-8, illus.

For pest and disease control, fertilizer application, seeding, weedkilling, frost protection, rain making, and the application of defoliants and desiccants (to accelerate the ripening of peas and other crops).

Physiology.

(*See also* 2411b, j, m, p, 2576, 3150, 3381.)

2331. Wellensiek, S. J., and Hakkaart, F. A.
Vernalization and age.
Reprinted from *Proc. kon. ned. Akad. Wetensch., Ser. C*, 1955, **58**: 16-21, bibl. 7, as *Publ. Lab. Tuinbouwpl. Wageningen* **128**.

In the red garden beet, variety Egyptian Flat Round, plants of any age are sensitive to the vernalizing effect of low temperature. As age increases, the sensitivity to low temperature increases. The hypothesis is put forward that low temperature acts as an induction and that day length acts as a realization. There is no juvenile phase for induction, but there may be a juvenile phase for realization. [Authors' summary.]

2332. Richardson, S. D.
Studies of root growth in *Acer saccharinum* L. I. The relation between root growth and photosynthesis.
Proc. kon. ned. Akad. Wetensch., Ser. C, 1953, **56**: 185-93, bibl. 3, illus.
II. Factors affecting root growth when photosynthesis is curtailed.
Proc. kon. ned. Akad. Wetensch., Ser. C, 1953, **56**: 346-53, bibl. 5.

First-year seedlings of *Acer saccharinum* were grown under constant conditions of light, temperature and humidity. The environmental conditions studied covered a range of light intensities from 200 to 12,000 lux, a temperature range of 5–30° C., and an atmosphere with and without CO_2. It was found that any change in environment of the shoot system affecting photosynthesis had a commensurate effect on the rate of root growth; the effect started 12–24 hours after the change. When photosynthesis was curtailed for long periods root growth apparently proceeded at the expense of storage products in the roots, but the leaves supplied an essential stimulus to root formation and elongation. —Lab. Plant Physiol. Res., Wageningen. [See also *H.A.*, 24: 2988.]

2333. Ranson, S. L., and Parija, B.
Experiments on growth in length of plant organs. II. Some effects of depressed oxygen concentrations.
J. exp. Bot., 1955, **6**: 80-93, bibl. 17.

Studies were carried out on seedling growth of several plant species including broad bean and vegetable marrow. At 20° C. growth in length of bean epicotyl and marrow hypocotyl was increased with a reduction of O_2 concentration below that of air, though growth was reduced when the O_2 percentage was 3·5 or less. Root extension was depressed at all O_2 percentages below 21.—King's College, Newcastle-upon-Tyne.

2334. Lee, A. E.
The effects of ascorbic acid on seedling organ growth of lupine and tomato.
Bull. Torrey bot. Cl., 1955, **82**: 1-8, bibl. 13.

Seeds of lupin and tomato were analysed for their ascorbic acid content. Seedlings were cultured for a 4-week period, during which determinations of the ascorbic acid content of the seedling organs was made. Finally, fresh weights of the seedlings were taken. Cotyledon removal 1 week after the start of the experiment resulted in decreased growth of lupin leaves and tomato roots, leaves and stems. Organ growth of seedlings without cotyledons, but receiving additional ascorbic acid, was equal to or better than that of intact seedlings. Ascorbic acid content was higher in the leaves than in other seedling organs. Similar concentrations of ascorbic acid were found in both lupin and tomato seedlings at the end of the 4-week period. A fairly uniform level of ascorbic acid was found in a given organ regardless of its treatment or amount of growth. The ascorbic acid content of lupin seed was considerably higher than that of tomato seed.—Plant Res. Inst., Univ. Texas.

2335. Torrey, J. G.
On the determination of vascular patterns during tissue differentiation in excised pea roots.
Amer. J. Bot., 1955, **42**: 183-98, bibl. 43, illus.

Isolated pea root tips cultured for 1 week in a sterile nutrient medium showed a uniform pattern of vascular tissue differentiation. It was concluded, first, that the primary tissue pattern in 0·5 mm. excised pea root tips arose as a product of the apical meristem. Secondly, the determination of the radial arrangement of the primary vascular tissue appeared to be related to the dimensions of the apical meristem at the time of pattern inception. [From author's summary.]—Univ. Calif., Berkeley.

2336. Kazarjan, V. O., and Avundžjan, E. S.
Translocation of chlorophyll in plants.
[Russian.]
Doklady Akad. Nauk S.S.S.R., 1955, **101**: 181-3, bibl. 6.

Experimental evidence is presented showing that some of the chlorophyll found in the phelloderm cells of the wood is translocated into newly developing leaves in the spring. The test plants included hawthorn, lilac, privet, honeysuckle, catalpa, *Elaeagnus* sp. and *Maclura* sp.

2337. Sívori, E. M., and Ragonese, A. E.
Valores osmóticos en plantas de las Salinas Grandes. (**Osmotic pressures in plants in the Salinas Grandes.**)
Rev. Invest. agric. B. Aires, 1952 [received 1955], **6**: 275-80, bibl. 10.

The osmotic pressure of the cell sap of 25 species of plants growing in saline conditions in the Salinas Grandes (17–20 in. rainfall) was measured. In some species it varied greatly between the rainy and the dry season and in others it was very constant. It varied greatly from species to species; for example, in the 1950/51 rainy season it ranged from 8·1 atmospheres in *Gymnocalycium delaetii* to more than 130 (the maximum that could be measured) in 2 species of *Atriplex*. With cacti pressures were low and mucilage content varied greatly between genera and within a single species during the course of the year. This phenomenon was also observed in some plants of other families.

2338. Currier, H. B., Esau, K., and Cheadle, V. I.
Plasmolytic studies of phloem.
Amer. J. Bot., 1955, **42**: 68-81, bibl. 26, illus.

The results are reported of a reinvestigation of the response of sieve elements to plasmolytic agents and an explanation is suggested for the divergent views on their plasmolytic properties. Some concepts of translocation are evaluated in the light of the present investigations and of the most recent literature on the subject. The test plants included vine, *Nicotiana* spp., *Cucurbita pepo* and *Pelargonium zonale*.

Photoperiodism and light effects.

(*See also* 2411h, 2412a, 2449, 2727.)

2339. Wellensiek, S. J., Doorenbos, J., and de Zeeuw, D.
The mechanism of photoperiodism.
Reprinted from [*Proc.*] *VIIe Congr. int. Bot.* [*Paris*] *1954*, pp. 307-15, bibl. 31, as *Publ. TuinbPlantent., LandbHogesch. Wageningen* **118**.

From a brief discussion of the main experimental results it is concluded that no specific flower forming hormone arises as a direct result of photoperiodism. As a working hypothesis it is suggested that flower formation is determined by a certain balance between products of photosynthesis and auxin. Leaves in unfavourable photoperiods inhibit flowering through an unfavourable relative auxin level. Photoperiodism removes this inhibition by bringing the balance between photosynthetical products and auxin to a value which enables the plant to form flowers. [Authors' conclusion.]

2340. Norris, L., and Calvin, M.
Photoperiodism and photosynthetic CO_2 assimilation.
Ann. Acad. Sci. fenn. ser. A, II. Chem., 1955, **60**: 32-6, bibl. 7.

"Although these experiments are of a very preliminary nature, the results clearly indicate that in the case of *Kalanchoë blossfeldiana* the metabolism of early products of photosynthesis is altered by growth in two different day lengths, one of which induces flower formation and the other of which does not."—Univ. of Calif., Berkeley.

2341. Canham, A. E.
Artificial lighting for plant growth.
Reprinted from *Trans. Illum. Engng Soc.*, 1954, **19**, as *Tech. Rep. electric. Res. Ass.* **W/T31**, 1954, pp. 28, bibl. 35, illus.

The author discusses the effects of different light conditions on plant growth. Applications of artificial light in research and commercial horticulture are also considered, together with the merits of different light sources for these purposes.

2342. Roodenburg, J. W. M.
Plantenbestraling. (**Artificial irradiation of plants.**) [English summary ¼ p.]
Meded. Dir. Tuinb., 1955, **18**: 93-6, illus.

The author considers that the use of the term irradiation, referring to the administration of energy to plants by means of artificial light sources, is preferable to the term illumination. Different light sources are best compared according to the distribution of spectral energy. The radiation of incandescent lamps has a marked long-day effect; they may be used for long-day treatment during the night, for the irradiation of short-day plants and for localized heating. For high intensity during the night to promote carbon assimilation, mercury vapour lamps are preferable, particularly as they are fairly cheap and have a long life. Reflectors aid in reducing light loss to a minimum, but must not cast too much shadow. This can be avoided by using powerful lamps with relatively small reflectors, which are hung fairly high above the plants, or by using narrow gutter-shaped reflectors with weaker lamps which are hung low over the plants.

2343. Brodführer, U.
Der Einfluss einer abgestuften Dosierung von ultravioletter Sonnenstrahlung auf das Wachstum der Pflanzen. (**The effect of differential dosages of ultra-violet, solar radiation on the growth of plants.**)
Planta, 1955, **45**: 1-56, bibl. numerous, illus.

Five plant species, including annuals and perennials, were grown at an altitude of 1,600 m. in frames under lights allowing 67%, 22% or 1·3% penetration by ultra-violet sun rays. Plant reactions to radiation varied with species, clone, season, developmental stage and dosage, but certain general trends could be formulated. It was found, for instance, that the symptoms of ultra-violet deficiency are reminiscent of nutrient deficiency, while excess causes shortening of internodes and retardation in development. Field experiments suggested that ultra-violet radiation acts on the growing point and its immediate neighbourhood and thereby influences growth. The possible relationship between ultra-violet radiation and the hormone regime of the plant is discussed.—Univ. Munich and Physik.-Meteorol. Observ., Davos.

2344. Stolwijk, J. A. J.
Wave length dependence of photomorphogenesis in plants.
Reprinted from *Meded. LandbHoogesch. Wageningen*, 1954, **54**: 181-244, as *Commun. Lab. Plant physiol. Res. Wageningen* **128**, 1954, pp. 64, bibl. 85, illus.

Experiments are described in which a number of plants were exposed to light of known intensities, applied either supplementing white light or as the only source of light. Cruciferous plants tested, namely *Brassica rapa*, *Sinapis alba* and *Iberis coronata*, were photoperiodically sensitive to blue and infra-red supplementary light, but did not respond to the region between 520 and 700 mμ. *Cosmos bipinnatus* and *Spinacia oleracea* showed no photoperiodic response to blue and infra-red supplementary light, but were sensitive to the region between 520 and 700 mμ. In lettuce and tomato flowering was not affected by the wave length of supplementary light. All species responded strongly to supplementary blue and infra-red irradiation by excessive elongation of internodes, leaves or petioles. Such elongation could be inhibited by simultaneous or subsequent exposure to red or green supplementary light. *Cosmos*, *Iberis*, lettuce, tomato and strawberry also responded strongly to light of restricted spectral regions from which white light had been excluded. In red, yellow and green light there was elongation of stems, petioles and leaves, as well as leaf epinasty. The plants in blue light were comparable to the controls, while those in violet light were shorter than the controls. In tomato dry weight was not specifically affected by wave length. The tips of tomato plants in yellow light contained more auxin than those in violet light. Plants given a large amount of infra-red with red light showed greater elongation, but leaf area, number, chlorophyll content and dry weight were reduced.

2345. Liverman, J. L., Johnson, M. P., and Starr, L.
Reversible photoreaction controlling expansion of etiolated bean-leaf disks.
Science, 1955, **121**: 440-1, bibl. 8.

The expansion of etiolated leaves is known to depend on light, with red light being maximally effective in promoting the expansion. The experimental results reported here are the first demonstration that this red-light-promoted expansion is reversed by subsequent exposure to far-red irradiation (7350 Å).—Calif. Inst. Technol., Pasadena.

2346. Charłampowicz, Z., and Walczak, H.
Promienie nadfioletowe w przetwórstwie owocowowarzywnym. (**The use of ultra-violet rays in fruit and vegetable preservation.**) [English and Russian abstracts.]
Przem. roln. spož., 1954, No. 2, pp. 45-9, illus., from abstr. in *Polish tech. Abstr.*, 1955, **1** (17), No. 3350.

Irradiation of fresh grapes, apples, gooseberries, cherries, currants, plums and tomatoes with ultra-violet rays from the Hanau S-500 lamp, for periods of from ½ to 10 min. at a distance of 18–35 cm., increased the keeping quality of the fruits. The best results were obtained with grapes, apples, gooseberries and cherries.

Growth substances.

(*See also* 2411e, s, u, w, 2412n, 2444, 2445, 2457-2462, 2533, 2547, Weeds and weed control section, 2964, 2965, 2982, 2992u, 3009, 3026i, 3179, 3196, 3197, 3216, 3364, 3367, 3374, 3396.)

2347. Åberg, B.
Studies on plant growth regulators. X. On the reproducibility of root growth results.
Ann. roy. agric. Coll. Sweden, 1954, **21**: 197-211, bibl. 28.

Flax root tests involving over 300,000 measurements were found to give reproducible results when relative growth rates were used for calculating, for instance, the average effect of an antiauxin as determined by several independent experiments. A comparison of flax, cress, wheat, tomato, and pea root tests showed that on the whole the effects of different auxins and antiauxins are of a similar type for roots of different species.

2348. Åberg, B., and Jönsson, E.
Studies on plant growth regulators. XI. Experiments with pea roots, including some observations on the destruction of indoleacetic acid by different types of roots.
Ann. roy. agric. Coll. Sweden, 1954, **21**: 401-16, bibl. 15.

The effects of two auxins (IA, 2,4-D), an antiauxin (1-NMSP or α-(1-naphthylmethylsulphide)-propionic acid), and a substance with combined synergistic and antiauxin effects (TIB or 2,3,5-triiodobenzoic acid) upon the growth of intact pea seedling roots and of pea root sections have been studied. With intact roots results resembling those previously described for flax seedlings [see previous abstract] were obtained, the most conspicuous difference being the very weak restorative effects of 1-NMSP on IA-inhibited pea roots. This phenomenon, and also the strongly diminished sensitivity to IA of pea root sections, may possibly be connected with the presence of a highly active IA oxidase system in the pea roots. Such an oxidase system seems to be absent, or in any case very weakly developed, in flax and cress roots. [From authors' summary.]

2349. van Raalte, M. H.
On the synergism of indole and indole-3-acetic acid in root production.
Ann. bogor., 1954, **1**: 167-80, bibl. 22.

Work on *Ageratum houstonianum* was carried out at the Treub Laboratory of Kebun Raya Indonesia, Bogor, and that on pea seedlings at Wageningen. The author summarizes the results as follows: "The rooting of petioles of *Ageratum* induced by indole-3-acetic acid was enhanced by the addition of indole. Indole did not increase the effect of naphthalene-1-acetic acid on rooting. The oxidation of indole-3-acetic acid by a crude enzyme extract from etiolated pea seedlings, as determined with the Warburg manometric method, was decreased by the addition of indole. It is suggested that the enhancing effect of indole on the rooting of *Ageratum* induced by indole-3-acetic acid is caused by its decreasing effect on the oxidation of this growth substance in the plant."

2350. Siegel, S. M., and Galston, A. W.
Peroxide genesis in plant tissues and its relation to indoleacetic acid destruction.
Arch. Biochem. Biophys., 1955, **54**: 102-13, bibl. 28.

In the IAA-oxidase system, visible radiation, the manganous ion and certain substituted phenols, particularly 2,4-dichlorophenol, all hasten the reaction by enhancing the generation of peroxides. It was found that IAA is itself peroxigenic, which indicates that the auxin molecule can be attacked both by a dehydrogenation, presumably involved in peroxide formation, and by peroxidation.

2351. Van Overbeek, J., Blondeau, R., and Horne, V.
Maleimides as auxin antagonists.
Amer. J. Bot., 1955, **42**: 205-13, bibl. 16, illus.

N-1-Naphthylmaleimide, N-(2,4-dichlorophenyl)-maleimide and ten other maleimides are auxin antagonists. The physiological activity of several of these maleimides is high. A deposit of 0·35μ g. of N-1-naphthylmaleimide per cm.^{2} of leaf surface is sufficient to cause complete defoliation of peach branches within three days. α-Naphthaleneacetic acid spray (10^{-4} M), simultaneously applied, prevents this defoliation. N-(2,4-Dichlorophenyl)-maleimide at 5×10^{-5} M inhibits by 50% the growth rate of isolated maize coleoptile sections growing in 0·05 p.p.m. of indoleacetic acid. This inhibition of the growth rate is reversible by 5 p.p.m. of indoleacetic acid. The maleimides may thus be classified as anti-auxins. [From authors' summary.]—Shell Devel. Co., Agric. Res. Div., Modesto, Calif.

2352. Struckmeyer, B. E., and Roberts, R. H.
The inhibition of abnormal cell proliferation with antiauxin.
Amer. J. Bot., 1955, **42**: 401-5, bibl. 9, illus.

A naturally-occurring substance has been extracted from plants in the flowering stage [see *H.A.*, 23: 2468]. It is a fat-soluble long-chain saturate keto-alcohol with 44 carbons. It has the property of inhibiting the effects generally produced with the addition of IAA at lower concentrations and has been referred to as an antiauxin. The antiauxin inhibits the cellular proliferation induced when some plants [*Xanthium* sp. and tomato] were wounded or treated with either 2,4-D, IAA, or a virulent strain of the crown gall organism. The degree of inhibition depended on the concentration of the stimulating agent used. [Authors' summary.]—Dep. Hort., Univ. Wisc., Madison.

2353. Hanson, J. B., and Bonner, J.
The nature of the lag period in auxin-induced water uptake.
Amer. J. Bot., 1955, **42**: 411-16, bibl. 18.

There is a lag period of several hours before artichoke tissue placed in 2,4-D will exhibit auxin-induced water uptake. The rubidium ion, acting as a potassium antagonist, will inhibit water uptake if applied during the lag period, but not after the water uptake is established. Rubidium does not inhibit 2,4-D accumulation. The data suggest that Rb may inhibit the formation by the tissue of the system which carries out the process of auxin-induced water uptake. [Authors' summary.]—Univ. Ill., Urbana, and Calif. Inst. Tech., Pasadena.

2354. Howell, R. W., and Skoog, F.
Effect of adenine and other substances on growth of excised *Pisum* epicotyls cultured *in vitro*.
Amer. J. Bot., 1955, **42**: 356-60, bibl. 23.

In an investigation of factors required for shoot growth, tests were made of the effects of various substances and natural products which promote the growth of *Pisum* epicotyls *in vitro*. Adenine sulphate exerts a marked growth-promoting effect. Not only does it reverse the inhibitory effect of indoleacetic acid (IAA), but its stimulatory effect is enhanced by the presence of IAA. Apparently both substances are required, and the proportions of the two may determine the growth rate. The adenine effect is much reduced in epicotyls cultured in the dark, but inclusion of cobalt with adenine in the medium restores the stimulation to about the level obtained with adenine alone in the light. One or more active substances in addition to IAA or adenine are present in fresh coconut milk. These not only stimulate elongation but promote the development of excised epicotyls to an extent approaching the normal development of shoots from intact seeds. Coconut milk and adenine when used together gave a greater stimulation than either gave alone. Growth stimulation from added adenine or coconut milk required the presence of roots, the formation of which, however, was not promoted by adenine. The results obtained support the hypothesis that a specific factor is synthesized in the roots. The effect of adenine is apparently related to this material.—U.S. reg. Soybean Lab., Urbana, Ill., and Dep. Bot., Univ. Wisc., Madison.

2355. v. Witsch, H., and Kasperlik, H.
Untersuchungen über den Einfluss der 2,4-D auf den Aneuringehalt 2,4-D-empfindlicher und -resistenter Pflanzen. **(Research on the effect of 2,4-D on the aneurin content of sensitive and resistant plants.)**
Planta, 1955, **45**: 264-72, bibl. 26.

Solutions of 2,4-D were applied to *Sinapis alba*, *Solanum lycopersicum*, *Vicia faba*, *Phaseolus vulgaris*, *Capsella bursa-pastoris*, *Matricaria inodora* and *Avena sativa*. The growth substance was applied as a spray and to nutrient solutions. In general, vitamin B_1 content was less in the leaves, but increased in the stems and roots after treatment. The relationship between changes in aneurin levels and other physiological reactions of the test plants due to 2,4-D treatment, and the significance of aneurin in carbohydrate metabolism and as a plasma growth substance are discussed.—Bot. Inst., München.

2356. Addicott, F. T., Lynch, R. S., and Carns, H. R.
Auxin gradient theory of abscission regulation.
Science, 1955, **121**: 644-5, bibl. 19.

From the available evidence, both published and in preparation for publication, on the physiology of abscission of leaves, flowers and fruits the following theory is proposed: Auxin is the principal endogenous regulator of abscission and its gradient across the abscission zone regulates the onset and rate of abscission. Abscission does not occur with auxin gradients characteristic of healthy, mature tissue, i.e. with high auxin distal, and low auxin proximal, to the abscission zone. Abscission occurs after a fall in the ratio of distal to proximal auxin and is accelerated when the gradient is reversed.

Biochemistry.

(*See also* 2411f, z, 2412c, d, f, h, i, l.)

2357. Mitchell, R. L.
The spectrochemical analysis of plant material.
Plant Analysis and Fertilizer Problems, [1955], pp. 48-67, bibl. 95, I.R.H.O. Paris, being part of *Proc. 8th int. bot. Congr. 1954.*

An account is given of present-day spectrochemical methods and, in particular, those used at the Macaulay Institute for Soil Research. In addition to specific analytical techniques, the author discusses sampling, preparation and the general principles involved.

2358. Specht, A. W., Smith, P. F., and Resnicky, J. W.
Simultaneous spectrographic procedure and its evaluation for analysis of plant materials.
Plant Analysis and Fertilizer Problems, [1955], pp. 68-77, I.R.H.O. Paris, being part of *Proc. 8th int. bot. Congr. 1954.*

The spectrochemical method used at the Plant Industry Station, Beltsville, Md, enables determinations of 6 trace elements to be made simultaneously with those of P, Mg and Ca.

2359. Lefebvre, J. M.
Les constituants azotés solubles chez les végétaux. (Méthodes d'étude.) (**Methods of study of the soluble nitrogenous constituents of plants.**)
Ann. agron., 1954, **5**: 995-1007, bibl. 32.

Modern methods of determining the soluble nitrogenous compounds in plants, including amino-acid determination by paper chromatography, are discussed.—Lab. Plantes fourrag., Rouen.

2360. Kloušek, J.
Technika papírové chromatografie aminokyselin v rostlinném materiálu. (**Technique of paper chromatographic analysis of amino-acids in plant material.**) [English and Russian summaries 5 lines each.]
Sborn. čsl. Akad. zeměd. Věd, Ser. A, 1954, **27**: 547-70, bibl. 132, illus.

A detailed account is given of a paper chromatographic procedure for amino-acid analysis including a number of new improvements in technique. [From author's summary.]

2361. Keser, M.
Papierchromatographische Untersuchungen über das Auftreten freier und gebundener Aminosäuren in höheren Pflanzen. (**Paper-chromatographic research on the occurrence of free and bound amino-acids in higher plants.**)
Planta, 1955, **45**: 273-88, bibl. 30.

Chromatographic estimation of free amino-acids and protein structure was carried out on plants which included *Spinacia oleracea*, *Vicia faba* and *Helianthus annuus*.

2362. Holley, R. W., and Cain, J. C.
Accumulation of arginine in plants afflicted with iron-deficiency type chlorosis.
Science, 1955, **121**: 172-3, bibl. 12.

Chlorotic and green leaves of blueberry, apple and magnolia were analysed and the free amino-acids identified by paper chromatography. Results indicated that there was an accumulation of free arginine in leaves showing iron-deficiency chlorosis. During recovery from chlorosis the free arginine disappeared.—N.Y. St. agric. Exp. Stat.

2363. Steward, F. C., Zacharius, R. M., and Pollard, J. K.
Nitrogenous compounds in plants: Recent knowledge derived from paper partition chromatography.
Ann. Acad. Sci. fenn. Ser. A, II. Chem., 1955, **60**: 321-66, bibl. pp. 4.

The subject is reviewed under 3 main headings: I. The chromatographic methods used; II. The summarized results of a qualitative survey; III. New or unusual amino or imino compounds that occur in plants. Many of the compounds discussed have been studied in plants of horticultural interest.

2364. Grobbelaar, N., Pollard, J. K., and Steward, F. C.
New soluble nitrogen compounds (amino- and imino-acids and amides) in plants.
Nature, 1955, **175**: 703-8, bibl. 31, illus.

The free occurrence in plants of many types of certain piperidine carboxylic acids and derivatives of glutamic acid has recently been discovered, and recent work on the subject is here reviewed.

2365. Wassink, E. C.
Starch conversion in leaves of *Helianthus tuberosus* and *H. annuus:* preliminary observations.
Reprinted from *Acta bot. neerl.*, 1953, **2**: 327-48, bibl. 3, as *Commun. Lab. Plant physiol. Res. Wageningen* **111**.

Starch hydrolysis in leaves of *Helianthus tuberosus* and of *H. annuus* was investigated. There were no conspicuous differences in starch hydrolysis in leaf halves, leaf discs or leaves attached to stem pieces. In general the temperature curve of starch hydrolysis showed a pronounced maximum at 0–3° C., a minimum at about 10° C., and another increase at temperatures above 15° C. In *H. tuberosus* the temperature curve was found to be much the same in leaves of varying physiological ages. In air with low CO_2 content, light intensity did not affect starch hydrolysis. In air with 5% CO_2, hydrolysis decreased considerably in both light and darkness. Lack of O_2 also caused decreased hydrolysis, especially at high temperatures. In some cases wilting promoted starch hydrolysis.

2366. Tombesi, L., Ruggieri, G., and Antoni, A.
Ricerche di fisiologia e di biochimica su *Vicia faba major*. Andamento di alcune attività enzimatiche e del contenuto in chetoacidi, azoto proteico, glucosio, amido ed acido citrico durante le fasi del ciclo vegetativo della pianta. **(Research on the physiology and biochemistry of *Vicia faba major*. The level of activity of certain enzymes and the contents of keto-acids, protein nitrogen, glucose, starch and citric acid at different phases of the life cycle.)** [English summary ½ p.]
Ann. Sper. agrar., 1955, **9**: 483-98, bibl. 9.

Investigations showed that: (1) catalase and carbonic anhydrase activity increase during the growth cycle, transaminase activity falls to a minimum during seed development, and amylase activity is considerable; (2) citric acid content is high and reaches a maximum during fruit development, while the contents of keto-acids and protein nitrogen increase during the growing cycle; (3) glucose content falls to a minimum after flowering while starch content is high and falls during the later stages of growth; (4) the glucose/starch ratio increases towards the end of the cycle, and the glucose/citric acid and citric acid/protein nitrogen ratios are inversely proportional during seed development.—Staz. chim.-agrar. sper., Rome.

2367. Tombesi, L., Ruggieri, G., and Antoni, A.
Ricerche di fisiologia e di biochimica su *Pisum sativum*. Andamento di alcune attività enzimatiche e del contenuto in chetoacidi, azoto proteico, glucosio, amido ed acido citrico durante le fasi del ciclo vegetativo della pianta. **(Research on the physiology and biochemistry of *Pisum sativum*. The level of activity of certain enzymes and the content of keto-acids, protein nitrogen, glucose, starch and citric acid at different phases of the life cycle.)** [English summary ⅔ p.]
Ann. Sper. agrar., 1955, **9**: 449-81, bibl. 8.

Investigations during vegetative growth, anthesis and fruit development showed that: (1) catalase and carbonic anhydrase activity increase during growth, transaminase activity is at a minimum during seed development, and amylase activity, though considerable, is variable in character; (2) glucose content is high and is inversely proportional to starch in the leaf; (3) citric acid and the keto-acids tend to increase during the period but protein nitrogen remains fairly constant and finally falls sharply; (4) during fruit development the glucose/starch and glucose/citric acid ratios are very high and the citric acid/protein nitrogen ratio is fairly constant.—Staz. chim.-agrar. sper., Rome.

Nutrition.

(*See also* 2411i, n, t, v, 2412e, m, 2580-2593, 3375, 3380.)

2368. Steenbjerg, F.
Manuring and plant production.
Plant Analysis and Fertilizer Problems, [1955], pp. 31-4, I.R.H.O. Paris, being part of *Proc. 8th int. bot. Congr. 1954*.

The author discusses the importance of the correct interpretation of yield curves in relation to mineral nutrition.

2369. Yarwood, C. E., and Jacobson, L.
Accumulation of chemicals in diseased areas of leaves.
Phytopathology, 1955, **45**: 43-8, bibl. 10, illus.

Tobacco, *Nicotiana glutinosa*, *Phaseolus*, hop, apple, peach, cucumber, *Vitis californica* and *Brassica campestris* were among the test plants. Leaves infected with a variety of pathogens (viruses, downy mildews, powdery mildews, rusts, leaf spot fungi) were exposed to vapours from Na_2S^{35}, to $H_3P^{32}O_4$, and C^{14} sucrose in a variety of ways and the accumulation of radioactivity was followed by means of autoradiographs and in a Geiger-Muller counter. Observations are described.—Univ. Calif., Berkeley.

2370. Biddulph, O.
The distribution of P, S, Ca, and Fe in bean plants as revealed by use of radioactive isotopes.
Plant Analysis and Fertilizer Problems, [1955], pp. 7-17, bibl. 27, illus., I.R.H.O., Paris, being part of *Proc. 8th int. bot. Congr. 1954*.

Radioactive P applied in a nutrient medium to bean plants accumulated to the greatest extent in the roots, with leaves being intermediate and stems containing the least. The apical bud, young leaves and roots accumulated currently available P in the highest concentration. Previously absorbed P was contributed from root, stem and leaf deposits to the growth of newer tissues. A single dose of P^{32} moved from the site of injection to parts which had the highest metabolic activity. There was a tendency for P to flow towards the roots. At all the nutrient concentrations used there was a high content of S in the trifoliate leaves. Roots were only slightly lower in S content. An S concentration of only 0·000125 M was necessary in the nutrient medium for a maximum S content within the tissues. Dry matter yield was maximum at 0·001 M. Sulphur was readily mobile within the plant and tended to accumulate in meristematic tissue at the expense of older tissue. Analyses showed that Ca was highest in primary leaves, and that the content decreased in trifoliate leaves, stems and roots. Tests confirmed Ca immobility in the phloem. There was a high concentration of root-associated Fe in bean plants growing in a nutrient medium. In younger leaves the Fe concentration was relatively high and evenly distributed; in primary leaves distribution was often somewhat mottled.—St. Coll. Washington.

2371. Ostrovskiĭ, N. I.
Toxicity to honey bees of herbicides and solutions of mineral fertilizers applied to the foliage. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1955, **20** (2): 32-4, bibl. 7.

In experiments under controlled conditions 1% concentrations of 2,4-D and 2M-4C [MCPA] used as contact poisons were harmless to bees, but the same and 0·3% concentrations used as stomach poisons killed over 90% of the bees. Results with solutions of mineral fertilizers used as contact and stomach poisons respectively were as follows: 1·5% superphosphate, 0 and 96% mortality; 2% ammonium sulphate, 7 and 22% mortality; 2% ammonium nitrate, 0 and 96% mortality; 10% ammonium nitrate as contact poison only, 26% mortality; 0·6% potassium chloride, 3 and 10% mortality; 20% NPK as contact poison only, 3% mortality; 0·01% boron, 0 and 50% mortality; and 0·005% boron as stomach poison only, 0% mortality. The practical implications of these findings are discussed.

2372. Barbier, G., Lesaint, M., and Tyszkiewicz, E.
Recherches, au moyen d'isotopes, sur les phénomènes d'autodiffusion dans le sol, et sur l'alimentation des plantes. **(Research on diffusion in the soil and on plant nutrition by means of isotopes.)**
Ann. agron., 1954, **5**: 923-59, bibl. 14.

Subjects studied in tomato were the excretion of P^{32} by the roots and absorption of P_2O_5 from the soil and from fertilizers.—Stat. centr. Agron., Versailles.

2373. Islam, M. A.
The role of solid phase in the phosphorus nutrition of plants.
Soil Sci., 1955, **79**: 115-21, bibl. 10, illus.

The nature of available P in P-treated Aiken clay loam was determined by extraction with different solvents. Lettuces were grown in a mixture of sand and P-treated Aiken soil, and in a sand culture receiving percolate from the sand-soil mixture. Half-strength Hoagland solution without P filtered continuously through the 2 layers of pots. Good plant growth was obtained when the roots were in contact with the soil. The plants in the sand culture were the same size as the control plants which received no P. In Sorrento fine sandy loam, a calcium-phosphate soil, good plant growth was obtained in both layers of pots.—Agric. Res. Stat., Dacca, E. Pakistan.

2374. Spencer, D., and Wood, J. G.
The role of molybdenum in nitrate reduction in higher plants.
Aust. J. biol. Sci., 1954, **7**: 425-34, bibl. 24.

Experiments are described which were designed to locate the molybdenum-requiring step in the chain of reactions involved in nitrate utilization in higher plants. Tomato plants deficient in molybdenum were treated with molybdate, and the changes in content of nitrate, nitrite, ammonia, amides, amino acids, and proteins, expressed on a dry weight basis, were followed over a short period. Two days after treatment with molybdate there was a marked decrease in the level of nitrate. During this period the concentrations of nitrite, ammonia, amides, amino acids, and protein increased. The nitrite and ammonia contents of the tops were doubled 4 hours after supplying molybdate to the molybdenum-deficient plants. It is concluded that in the intact plant molybdenum is essential for a reaction involved in the reduction of nitrate to nitrite. The known metabolic functions of molybdenum are discussed briefly. Analytical methods used in these determinations are described. [Authors' summary.]—Bot. Dep., Univ. Adelaide, S. Aust.

2375. Shuel, R. W.
Nectar secretion in relation to nitrogen supply, nutritional status, and growth of the plant.
Canad. J. agric. Sci., 1955, **35**: 124-38, bibl. 21.

Variation in growth and chemical composition of snapdragon and alsike plants growing in sand culture was effected by varying the concentration of nitrogen in the culture solution. Nectar yield per flower was comparatively good under conditions of low N supply, moderate growth and a high level of sugar in the tissue; comparatively poor under conditions of abundant N supply, luxuriant growth and a low sugar level in the tissue. Other sources of variation in nectar secretion were daily weather fluctuations and a N level-weather interaction. An hypothesis is advanced to account for variation in secretion in terms of the interrelationships of N supply, photosynthesis, and growth. [Author's abstract.]—Apicult. Dep., Ontario agric. Coll., Guelph.

2376. Broyer, T. C., and others.
Chlorine—a micronutrient element for higher plants.
Plant Physiol., 1954, **29**: 526-32, bibl. 6, illus.

Chlorine deficiency in tomatoes caused wilting of the leaflet tips followed by chlorosis, bronzing and necrosis in the wilt areas; no fruit was produced by severely affected plants. The addition of chlorine as chloride to the plants prevented deficiency symptoms; severely deficient plants recovered after chlorine was applied in the nutrient solution or by injection into the stem. Plant growth was correlated with the chlorine supply in the nutrient solution. Bromine appeared to act as a partial substitute for chlorine.—Univ. Calif.

2377. Allerton, F. W.
Trace element deficiencies.
Gdnrs' Chron., 1955, **137**: 4-5.

A guide to the use of chelates [sequestrene iron and others] for the alleviation of deficiencies of Fe, Mn, Cu, and Zn, on a small scale.

2378. Wallace, T.
The application of trace elements to crops.
Plant Analysis and Fertilizer Problems, [1955], pp. 22-30, bibl. 57, I.R.H.O., Paris, being part of *Proc. 8th int. bot. Congr. 1954.*

The author briefly discusses soil conditions in relation to the supply and availability of trace elements, effects of soil management practices on availability of trace elements, trace element requirement of individual crops, and the nature of the crop in relation to methods of application.

2379. Mississippi Agricultural Experiment Station.
Crop and fertilizer recommendations for 1955.
Miss. Fm Res., 1955, **17** (11): 3-6.

Recommendations on varieties, sowing dates and rates and fertilizer practice for Mississippi crops, including sugar cane, tung, fruits, vegetables, shade trees and lawns.

2380. Cain, J. C., and others.
Report of the Committee on mineral deficiency diagnosis. Methods of expressing composition of plant tissues.*
Proc. Amer. Soc. hort. Sci., 1953, **62**: xxii-xxiv.

The members of the committee feel that workers on mineral nutrition should be encouraged to express their data not only in the traditional weight bases but also in terms of molar and equivalent concentrations. In this short article a table is given showing the molar and equivalent concentrations per 100 grams transposed from percentages and parts per million, and hypothetical leaf analysis showing comparative values when expressed in different units of the following elements: N, P, K, Ca, Mg, Na, Cl, S, Al, B, Co, Cu, Fe, Mn, Mo, and Zn.—Ithaca, N.Y.

Soils, composts and irrigation.

(*See also* 3371, 3373, 3393.)

2381. Chaminade, R., and Blanchet, R.
Action de l'humus sur la nutrition minérale des plantes. **(The effect of humus on the mineral nutrition of plants.)**
Ann. agron., 1954, **5**: 741-3.

Analyses showed that plants grown in the presence of humus often have a higher content of mineral nutrients than plants grown without humus, especially at the beginning of the season. These observations led the authors to suggest that humus has the effect of increasing the permeability of cells to salts, a hypothesis which was confirmed by plasmolytic studies on the epidermis of *Viola cornuta* petals.—Versailles.

2382. McNaught, K. J.
Effect of synthetic soil conditioners on plant nutrient uptake.
N.Z. J. Sci. Tech., Sect. A, 1955, **36**: 450-3, bibl. 4.

Analyses of mustard samples from pot experiments indicate that improved structure resulting from the use of soil conditioners may have little influence on nutrient concentrations in plant tissues, even where total nutrient uptake is greatly increased as a result of marked yield responses. A big increase in potassium concentration was found in plants on a potassium-deficient soil which received potash fertilizer and which showed large yield responses to a polyacrylonitrile conditioner, but other differences were smaller or non-significant. [Author's summary.]—Rukuhia Soil Res. Stat., Hamilton.

2383. DeMent, J. D., and others.
Effect of field applications of synthetic soil-aggregate stabilizers on plant emergence.
Soil Sci., 1955, **79**: 25-31, bibl. 4.

Several commercially available, synthetic soil-aggregate stabilizers were tested for their effectiveness in increasing emergence of plants in Miami silt loam and Hoytville clay. Both liquid and solid forms of the chemicals were applied as surface and depth treatments. Soil crusting was reduced in treated plots. There were increases in the stand of direct-sown tomatoes in the clay, and of maize, soybeans and turnips in the loam. No stand increase was apparent in lettuce, beet or bush beans in the loam. Solutions of the chemicals sprayed over the seed after sowing were as effective in improving emergence as depth treatment or depth and surface treatment. Aggregation of the top ½ in. of the soil was at least temporarily increased by the use of chemicals, particularly when depth and surface treatments were both given. The conditioners HPAN, IBMA and VAMA gave somewhat better control of crusting than the other chemicals used. All chemicals, however, were equally effective in improving rates of seedling emergence. Rates of IBMA as low as 0·02% by weight or 0·017 lb. per gal. were effective in preventing crusting and increasing emergence. Solution concentrations of 0·5% by weight or 0·042 lb. per gal. of active chemical were found to be satisfactory both in ease of application and in effectiveness of surface improvement.—Ohio St. Univ.

2384. Baker, J. R., and Dunn, S.
Sawdust composts in soil improvement. III. Pot cultures studies with composts from (a) outdoor pits, (b) wooden bins with high moisture, (c) other mixtures.
Plant and Soil, 1955, **6**: 113-28, bibl. 8.

In pot experiments, mixtures of hardwood shavings composts with soil were used in a study of their effects on plant growth. Test plants included radish, tomatoes, cabbage, onions, spinach beet, swedes, peas and sunflower. As aids to composting various manures, green vegetation and commercial fertilizers were used. Both poultry manure and green vegetation were confirmed as being valuable aids to composting; inorganic fertilizers were poor in this respect. No particular advantage was apparent in the use of a krilium plus soil mixture compared with sawdust compost. In an outdoor experiment mixtures of sewage sludge and sawdust with or without soil gave poorer yields than the controls in soil only. In greenhouse experiments such mixtures gave significantly better yields than soil controls with some crops, but not with others. The value of fresh, macerated mustard leaves as a composting aid was measured by its effect on plant growth. Its effect was beneficial for the first crop (cabbage), but disappeared with the second crop (maize). Mixtures of sawdust with various amounts of lime and a complete fertilizer showed that inorganic fertilizers were not effective composting agents. Outdoor wooden bins near a moisture supply were found to be more satisfactory containers for composts than outdoor pits.—N.H. agric. Exp. Stat., Durham, U.S.A. [For earlier work see *H.A.*, 23: 2491.]

2385. Dänhardt, W., and Rämsch, H.
Keimgehalt der Torfkulturerden und der sogenannten Einheitserde. **(The microorganism content of horticultural peat soils and of the so-called standard potting soil.)**
Dtsch. Gartenb., 1955, **2**: 126-9, 147, bibl. 12, illus.

The bacterial and fungal spore content of peat and clay, the main ingredients of Fruhstorfer's standard potting soil (*H.A.*, 24: 620) was found to be low. During 4 weeks' storage in the open, however, the materials and the compost made up from them became infected with many fungi, including plant pathogens.

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* Inadvertently omitted from *H.A.*, Vol. 24, No. 3.

The study emphasizes the importance of storing practically sterile soil under proper conditions.—Inst. f. Gartenbau, Dresden-Pillnitz.

2386. Brown, L. N.
Contour planting and irrigating on moderate-to-steep slopes.
Circ. Calif. agric. Exp. Stat. Ext. Serv. **440,** 1954, pp. 23, bibl. 2, illus.

Information is given on how to lay out and irrigate a contour planting of deciduous or citrus orchards, particularly on a small scale. Brief notes are also given on planting bush berries, strawberries and vegetables on sloping land.

2387. Morocco.
[Sprinkler irrigation.]
Fruits et Prim., 1954, **24**: 459-500.

This number is mainly devoted to sprinkler irrigation and contains 7 papers read at a conference on the subject held at Meknes in November, 1954. These are: Darlot (2)—a general discussion of the system, and the important factor of evaporation; Grevet—the different types of sprinkler and the effects of low pressure, high wind and high-speed rotation on distribution pattern; Lemoyne de Forges—economics; and 3 on the apparatus manufactured by various firms.

Radioactivity.

(*See also* 2572, 2577d, 2590, 2999, 3015, 3026h.)

2388. Joint Committee on Atomic Energy U.S. Congress.
The contribution of atomic energy to agriculture, being ***Hearings before the Subcommittee on research and development of the Jt Cttee on atomic energy Congress of the U.S. 83rd Congress 2nd Session, March 31 and April 1 1954,*** 1954, pp. 87
H.M.S.O., Kingsway, London, 2s. 4d.

These talks by agricultural experts from different parts of the States and the discussions arising therefrom throw light on present development in the use of atomic energy in many phases of agricultural endeavour. The uses discussed include the following: For determining root growth, for bringing about mutations to obtain disease-resistance, for tracing the processes and exact steps in photosynthesis—perhaps the most fundamental of all—, for tracing the path of nutrient elements especially when they are applied to the leaf, for development of stable systemic fungicides, for preservation of foodstuffs in preference to present methods of freezing, drying, heating, etc.

2389. Sax, K.
The effect of ionizing radiation on plant growth.
Amer. J. Bot., 1955, **42**: 360-4, bibl. 17.

Irradiation of seeds of various crop plants with 3,000 r of X-rays seemed to stimulate the growth of lettuce and cabbage, but more critical tests showed no significant effect of the irradiation. Irradiation of *Gladiolus* bulbs with 4,000 r of X-rays did result in significantly earlier flowering. [Author's summary.]—Arnold Arbor., Harvard Univ.

Seeds.

(*See also* 2404, 2405, 2804-2807, 2942, 3011, 3012, 3027.)

2390. Soriano, A.
Estudios sobre germinación. I. (**Studies on germination. I.**)
Rev. Invest. agríc. B. Aires, 1953, 7: 315-40, bibl. 18.

Studies were made on: (1) the effects of light, rain, activated charcoal, temperature, pretreatments and the seedcoat on the germination of *Amaranthus fimbriatus* seeds and on the breaking of dormancy; (2) the effects of rain on germination and subsequent growth of 5 Palestinian plants, namely *Anastaticha hierochuntica*, *Cutandia memphitica*, *Carrichtera annua*, *Erucaria boveana* and *Citrullus colocynthis*; (3) the effect of artificial rain on the germination of seeds contained in soil samples collected in California, including *Eriophyllum ambiguum*, *Pectocarya* spp., and other plants.

2391. Toole, E. H., and others.
Photocontrol of *Lepidium* seed germination.
Plant Physiol., 1955, **30**: 15-21, bibl. 10.

Action spectra for germination control of *Lepidium virginicum* and *L. densiflorum* seeds were measured to establish features of the photoreaction that is a general factor involved in growth of higher plants. Interactions of the photoreaction with a shift of temperature and with nitrate and thiourea, factors known to affect germination of light-responsive seed, were measured. These are coupled in such a way as to cause opposite changes in sensitivity for promotion and inhibition of germination by the photoreaction. The relative sensitivity for promotion and inhibition of germination of *L. virginicum* was varied by more than 15-fold. This indicates that a molecule other than the pigment is involved in the photoreaction. Coumarin promotes germination of *L. virginicum* at concentrations of 0·5 and $1{\cdot}0 \times 10^{-5}$ molal and inhibits germination at higher concentrations. This indicates that it effects control by two-point attachment in a rate-limiting reaction for germination, as does auxin for cell elongation. Germination was almost completely inhibited by $1{\cdot}0 \times 10^{-4}$ molal coumarin. A single shift in temperature of imbibed seeds of *L. virginicum* from 15° to 25° C. at the time of irradiation in the red enhanced the population of germination without change of variance. A shift from 25° to 15° C. was without effect on germination. [From authors' summary.]—U.S.D.A., Beltsville, Md.

Glasshouses and frames.

(*See also* 2411c, l, o, 2412j, 2812, 2933, 2992y, 3396.)

2392. van der Helm, G. W., Klapwijk, J. G., and van Harten, J.
De verrolbare kas. (**The movable glasshouse.**) [English summary ½ p.]
Tuinbouwvoorlichting 4, 1955, pp. 35, illus., fl. 1.75.

The construction of movable houses built in the Netherlands is described and illustrated. Methods of using such a glasshouse in a vegetable nursery and a mixed flower and vegetable nursery are suggested. The extra cost per square metre per annum as compared with a fixed house is 42 cents [about 1s.]. Yields in movable glasshouses are higher than in fixed ones; other advantages include higher quality, wider choice of crops, more intensive use of glass and better soil condition. [See also *H.A.*, 25: 89.]

2393. ANON.
Unorthodox homemade mobile glasshouse.
Comm. Gr, 1955, No. 3096, p. 979, illus.

A mobile glasshouse is described which is formed from Dutch lights. The supporting structure is made of steel, and part of it forms the heating system.

2394. MI.
Ein vielversprechendes neues 6-m-Haus. **(A promising new 6 m. glasshouse.)**
Schweiz. Gärtnerztg, 1955, **58** (18): 5-6, illus.

A 6 m. wide glasshouse is described which has a second roof surface suspended over the normal roof, so enabling inductive ventilation to be used. A fast primary air stream passes between the roof surfaces, carrying with it a slow secondary air stream from inside the house. The secondary roof may be operated from the ground.

2395. RENARD, W.
Plastikfolien zur Innenauskleidung von Gewächshäusern. **(Plastic sheets for the inner layer of double-glazed greenhouses.)**
Gartenwelt, 1955, **55**: 105-7, illus.

In Denmark plastic sheets have been successfully used as a glass substitute for the inner layer of double-glazed greenhouses. The 0·1 mm.-thick sheets are easy to fix and they are claimed to be as transparent and effective an insulating material as glass. Plastic sheets have also proved their worth as covers for propagation beds in glasshouses.

2396. ANON.
A plastic greenhouse.
Amer. Fruit Gr, 1955, **75** (2): 37, illus.

An 18 × 84 ft. greenhouse, which has been developed by the University of Kentucky, can be constructed for $250. By using 2 layers of plastic it was possible to reduce heating costs to about half those of glass. Propane or butane bottled gas was used for heating. The polyethylene film deteriorated during high light intensity in summer and was renewed each autumn at a cost of $25. A glasshouse of the same size would cost $4,000 to $5,000 with much greater maintenance costs. [See also *H.A.*, 25: 1266.]

2397. PAYOT, M.
Le transport dans les serres. **(Transport in glasshouses.)**
Utilisation du papier pergamin en guise de double vitrage. **(The use of parchment paper in place of double lights.)**
Rev. hort. suisse, 1955, **28**: 117, illus.

I. For the transport of plants in greenhouses a Swedish firm has constructed carriers suspended from a rail under the roof. On these the plants are moved at bench-height over the gangway.

II. Parchment paper is tacked to the laths of glasshouse lights in winter to save the cost of double lights. In view of the reduced transparency parchment can be used for certain crops only.

2398. ANON.
Plastic eenruiters. Plastic in warehuizen en kassen. **(Plastic frames. Plastic in dutch light structures and glasshouses.)**
Jversl. Proefst. Groent. Fruit. Glas, Naaldwijk, 1954, p. 30.

Cucumbers and endive in frames showed no difference in growth when plastic was substituted for glass. In heated dutch light structures and glasshouses the temperature was higher under plastic than under glass. A disadvantage of plastic is that much condensation forms on it.

2399. ANON.
New plastic Dutch lights.
Comm. Gr, 1955, No. 3090, p. 608.

Plastic dutch lights recently brought on the market are claimed to have many advantages over the orthodox glass lights. A double-skin light with an air space between the two sheets of plastic is also available.

2400. MÜCKE, K. H.
Der fahrbare holländische Doppelkasten. **(Mobile double-span dutch lights.)**
Tech. Landw., 1955, **7**: 182-3, illus.

Of the several types of mobile dutch lights discussed and illustrated, preference is given to a double-span construction with side-walls of glass. A suggestion is made for a rotation of vegetable crops to be grown partly in the open and partly under these lights.

2401. FINKELMANN, K.
Gummiprofile statt Kitt. **(Adhesive strips for glazing instead of putty.)**
Dtsch. Gartenb., 1955, **2**: 53-4.

Encouraging results under extreme temperature conditions were obtained with proprietary adhesive strips used as putty substitutes for glass insertion in greenhouses and frames. The trials are being continued.—Inst. f. Landtech., Zweigstelle f. Tech. i. Gartenb., Quedlinburg-Ditfurt.

Machinery and equipment.

(*See also* 2407, 2408, 2411c, q, r, 2412b, k, 2487, 2489, 2497.)

2402. THE COMMERCIAL GROWER.
Mech. Hort., Spring 1955, No. 3, pp. 33-74, illus.

Articles in this issue cover a wide range of subjects, including: care and maintenance of rotary cultivators; planning irrigation mains and spray lines; vegetable washing machines; modern herbicidal developments in horticulture; the use of electricity for tomato propagation; pump circulation in glasshouse heating; prepackaging machines; economic fruit handling from orchard to market.

2403. AUGUST, E.
Erfahrungen mit der Schmotzer-Kombi im Baumschulbetrieb. **(Experience with the Schmotzer-Kombi in the nursery.)**
Dtsch. Baumsch., 1955, **7**: 143-8, illus.

A new diesel-engined tractor is described which has given satisfactory service in manure-spreading, planting, hoeing and spraying during 2 years on a commercial nursery. There are 3 sizes in track width, of which 2 m. is the most satisfactory.

2404. Tod, J. R.
Electric buzzer for seed sowing.
Grower, 1955, **43**: 819, illus.

An electric buzzer bolted to a small pointed aluminium trough has been used to sow fine seed in drills in boxes. The trough, which contains the seed, is vibrated by the buzzer so that the seed hops over the pointed end into the drill. The rate of flow can be regulated by tilting the trough.

2405. Abbiss, H. W.
Novel tray steriliser.
Grower, 1955, **43**: 429, illus.

Boxes and trays to be sterilized are put onto roller conveyers which, aided by the slope of the ground, carry the boxes to the treating bath. There the trays are immersed in the sterilizing solution which is kept at 180° F. with a wetter added. The trays are kept under the solution by a series of wooden rollers, and are forced through the bath by the pressure of trays behind. Roller conveyers from the tank carry the trays to their stacking quarters.

2406. Bouyoucos, G. J.
Electrical resistance methods as finally perfected for making continuous measurement of soil moisture content under field conditions.
Quart. Bull. Mich. agric. Exp. Stat., 1954, **37**: 132-49, bibl. 6, illus.

Two electrical resistance methods have been developed for making a continuous measurement of soil moisture under field conditions. One method employs a plaster-of-paris block and the other a nylon unit encased in plaster-of-paris casting. For greater durability of the plaster-of-paris, both units are impregnated with a nylon liquid plastic. Both units are based on the same principle. The effective range of the plaster-of-paris block is from field capacity to somewhat beyond the wilting point of plants. The effective range of the nylon plaster-of-paris encased units is from near saturation to a point above the air-dry condition. The soil moisture bridge and the alternating current impedance meter have been improved and equipped with some of the newest electronic parts, such as the transistor, new type of oscillator, etc. [From author's summary. See also *H.A.*, 25: 1248.]

2407. Schander, H.
Ein automatisches Mess- und Zählgerät für Massenuntersuchungen. **(An automatic measuring and counting instrument for the study of populations.)**
Züchter, 1955, **23**: 80, illus.

For frequency distribution studies in pome fruit seedlings a simple instrument was evolved which measures the girth of the plants and counts them in individual classes. If counting is interrupted at 100 or 1,000 the per cent-distribution can be read off directly. The instrument is described and illustrated.—Tech. Hochschule, Hanover.

2408. Larsen, S., and Nielsen, G.
Et transportabelt apparat til måling af relative fotosyntese ved hjaelp af C^{14}. **(A portable apparatus for measuring relative photosynthesis with the aid of C^{14}.)** [English summary ½ p.]
Tidsskr. Planteavl, 1955, **58**: 651-6, illus.

An illustrated description is given of an apparatus which was used to study the effect of fungicides on the photosynthetic activity of apple leaves with the aid of labelled carbon dioxide. The experimental techniques employed are discussed.

2409. Ranson, S. L., and Harrison, A.
Experiments on growth in length of plant organs. I. A recording auxanometer.
J. exp. Bot., 1955, **6**: 75-9, bibl. 4, diagrams.

An auxanometer which automatically records growth increments of 0·0009 in. is described. [From authors' summary.]—King's College, Newcastle-upon-Tyne.

2410. Dalbro, S.
En temperaturmålingsmetode. **(A method of measuring temperature.)**
Horticultura, 1955, **9**: 49-51, bibl. 7.

An account is given, with samples of calculations, of a method of air temperature measurement based on the rate of inversion in a buffered, aqueous sucrose solution. The method, which was developed in Switzerland for recording mean temperatures over long periods, is labour-saving, relatively simple and involves little expense.

Noted.

2411.

a Beaudreau, G. S., and Remmert, L. F.
Krebs cycle activity of particles from bean seedlings.
Arch. Biochem. Biophys., 1955, **55**: 469-85, bibl. 20.
Results indicate the cycle to be operative in etiolated french bean seedlings.

b Bhattacharjya, S. S., and Linskens, H. F.
Recent advances in the physiology of self-sterility in plants.
Sci. and Cult., 1955, **20**: 370-3, bibl. 27.
A review.

c Besemer, A. F. H.
Middelen voor verneveling in kassen. **(Atomised sprays in glasshouses.)** [English summary 5 lines.]
Meded. Dir. Tuinb., 1955, **18**: 188-92.

d Bider, M.
Statistische Untersuchungen über die Hagelhäufigkeit in der Schweiz und ihre Beziehungen zur Grosswetterlage. **(Statistical studies on the frequency of hail in Switzerland and its relation to weather conditions in general.)**
Reprinted from *Arch. Meteor. Ser. B*, 1954, **6**: 66-90, bibl. 8, as *Wiss. Mitt. Eidg. Komm. Stud. Hagelbildung* **5**.

e Bottelier, H. P.
Ageratum houstonianum **Mill. as test object for growth substances. 1. The relation between the epinastic curving of the leaf petioles and the concentration of indoleacetic acid, and the effect of light thereon.**
Ann. bogor., 1954, **1**: 185-200, bibl. 4, illus.

Burriel Martí, F., and Jiménez Gómez, S.
Revisión de métodos colorimétricos para la determinación de azufre, en diferentes formas, en minerales, suelos y plantas. I. Determinación de SH$_2$ y S$^=$. **(Review of colorimetric methods of determining sulphur in different forms in minerals, soils and plants. I. Determination of H$_2$S and S$^=$.)** [French summary 5 lines.]
An. Edaf. Fis. veg. Madrid, 1955, **14**: 103-14, bibl. 37.

g Cattell, M. D.
Our garden heritage.
Plants and Gdns, 1954/55, **10**: 298-305, illus.
A short history of horticulture in the north-eastern United States from Indian times to the twentieth century.

h Chouard, P.
État présent et perspectives d'avenir des recherches sur la photosynthèse envisagées du point de vue de l'agriculture. **(Present and future lines of research on photosynthesis, with special reference to agriculture.)**
C.R. Acad. Agric. Fr., 1955, **41**: 115-26, bibl. 8.

i de Cock, P. C.
Influence of humic acids on plant growth.
Science, 1955, **121**: 473-4, bibl. 7.

j Crafts, A. S.
Composition of the sap of xylem and phloem and its relation to nutrition of the plant.
Plant Analysis and Fertilizer Problems, [1955], pp. 18-21, bibl. 11, I.R.H.O. Paris, being part of *Proc. 8th int. bot. Congr. 1954.*
A review.

k Dorst, J. C.
Impressions on plant breeding and genetics in Russia. [Dutch summary.]
Euphytica, 1955, **4**: 45-52.

l van Drenth, A.
Electrisch werkende regeltoestellen voor de verwarmingstechniek in de tuinbouw. **(Electrically operated regulators for heating systems in horticulture.)** [English summary 9 lines.]
Meded. Dir. Tuinb., 1955, **18**: 97-104, illus.
Types of thermostat used for automatic temperature control.

m Eberhardt, F.
Der Atmungsverlauf alternder Blätter und reifender Früchte. **(The respiration curve of ageing leaves and ripening fruits.)**
Planta, 1955, **45**: 57-67, bibl. 32.
In *Sambucus nigra* (fruit), *Pterocarya caucasica*, *Parthenocissus vitaceae*, *Aesculus humilis* (leaf).

n Ferrand, M.
L'analyse des plantes et la pratique agricole. **(Plant analysis and agricultural practice.)**
Plant Analysis and Fertilizer Problems, [1955], pp. 81-9, bibl. 19, I.R.H.O. Paris, being part of *Proc. 8th int. bot. Congr. 1954.*
The value of plant analysis as a guide to nutritional balance.

o Fischer-Schlemm, W. E., and Krepela, W.
Die heutigen Erddämpfanlagen. **(Present-day equipment for soil sterilization and prospects of its development.)**
Tech. Landw., 1955, **7**: 179-82, illus.

p Franke, W.
Über die Biosynthese des Vitamins C. I. Die Beziehungen zwischen Vitamin C und der Atmung. II. Zur Biochemie und Physiologie der Vitamin C-Synthese. **(On the biosynthesis of vitamin C. I. The relations between vitamin C and respiration. II. On the biochemistry and physiology of vitamin C synthesis.)**
Planta, 1954, **44**: 437-58, bibl. 40, and 1955, **45**: 166-97, bibl. 56.
The experimental plants included asparagus, onion and *Sauromatum guttatum.*

q Instituut voor Tuinbouwtechniek, Wageningen.
Snelkoppelingen voor sproeileidingen e.d. **(Quick couplings for hose pipes.)**
Beproevingsrapport I.T.T. Wageningen **12**/2810, 1954, pp. 4, illus.

r Instituut voor Tuinbouwtechniek, Wageningen.
Mestverdunner. **(Apparatus for mixing fertilizer solutions.)**
Beproevingsrapport I.T.T. Wageningen **13**/4665, 1954, pp. 8, illus.

s Kefford, N. P.
The growth substances separated from plant extracts by chromatography. I.
J. exp. Bot., 1955, **6**: 129-51, bibl. 60.
Material included broad bean, pea and sunflower.

t Kick, H.
Zur flammenphotometrischen Bestimmung von Calcium, Magnesium und Mangan in Pflanzenaschen und Bodenauszügen. **(The determination of calcium, magnesium and manganese in plant ash and soil extracts by flame photometry.)**
Z. PflErnähr. Düng., 1954, **67**: 53-7, bibl. 7.
Landw. Hochsch. Hohenheim.

u Libbert, E.
Das Zusammenwirken von Wuchs- und Hemmstoffen bei der korrelativen Knospenhemmung. **(The combined action of growth promoting and inhibiting substances in the correlative inhibition of bud development.)**
Planta, 1954, **44**: 286-318, bibl. 55, and 1955, **45**: 68-81, bibl. 10.
In pea.

v Lundegårdh, H.
Physiological aspects on tissue analysis as a guide to soil fertility.
Plant Analysis and Fertilizer Problems, [1955], pp. 1-6, I.R.H.O. Paris, being part of *Proc. 8th int. bot. Congr. 1954.*

w Marrè, E., and Arrigoni, O.
Determinazione *in vivo* dell'attività deidrogenasica mediante la tecnica al tetrazolio. **(Determination of dehydrogenase activity *in vivo* by the tetrazolium method.)** [English summary ⅓ p.]
Azione del 2-4 dinitrofenolo, del cianuro, dell'azide e di alcuni inibitori dell'attività deidrogenasica sulla riduzione *in vivo* del cloruro di trifeniltetrazolio. **(Effect of 2,4-dinitrophenol, cyanide, azide and some other inhibitors of dehydrogenase activity on the reduction of triphenyltetrazolium chloride *in vivo*.)** [English summary ½ p.]
Nuovo G. bot. ital., 1954, **61** (1): 21-8, bibl. 9, 29-37, bibl. 14.
The experimental material consisted of Jerusalem artichoke discs.

x Miettinen, J. K.
Free amino acids in the pea plant *Pisum sativum*).
Ann. Acad. Sci. fenn. Ser. A II Chem., 1955, **60**: 520-35, bibl. 29.

y Mirimanoff, A.
L'emploi des engrais chimiques exerce-t-il une influence sur la valeur nutritive des fruits et des légumes ainsi que sur la santé publique? **(Does the use of chemical fertilizers affect the nutritive value of fruits and vegetables and the public health?)**
Rev. hort. suisse, 1955, **28**: 144-6, bibl. 7.
A review suggesting that artificials have no adverse effects.

z Nicholas, D. J. D.
Rapid chemical tests for determining the mineral status of plants.
Plant Analysis and Fertilizer Problems, [1955], pp. 78-80, bibl. 7, I.R.H.O. Paris, being part of *Proc. 8th int. bot. Congr. 1954.*
The Long Ashton tissue test.

2412.

a Nuernbergk, E. L.
Über den zeitlichen Verlauf der Photosynthese bei Gewächshauspflanzen. **(On the rhythm in the photosynthetic activity of greenhouse plants.)**
Gartenbauwiss, 1955, **1** (n.s.): 391-8, bibl. 5.
In *Aloe arborescens*, *Bryophyllum daigremontanum*, *Kalanchoë blossfeldiana.*

b Raposo, J. R.
A rega por aspersão. **(Sprinkler irrigation.)**
Agros, 1955, **38**: 9-69, bibl. 41, illus.
Sprinklers, piping, pumps, motors, choice of equipment.

c Scharrer, K., and Preissner, R.
Der Vitamin-B_1-Gehalt der Pflanze in Abhängigkeit von ihrer Ernährung. **(The vitamin B_1 content of plants in relation to their nutrition.)**
Z. PflErnähr. Düng., 1954, **67**: 166-79, bibl. 16.
Trials with cereals and field peas.

d Scharrer, K., and Jung, J.
Fehlerquellen bei der flammenphotometrischen Calciumbestimmung und ihre Behebung. **(Sources of error in the estimation of calcium by flame photometer and their elimination.)**
Z. PflErnähr. Düng., 1954, **67**: 240-8, bibl. 4.

e Scharrer, K., and Kühn, H.
Zur Methodik der Wasserreinigung für Gefäss- und Wasserkulturversuche unter besonderer Berücksichtigung der Mikronährstoffe. **(Methods of water purification for pot and soilless culture trials, with special reference to micro-nutrients.)**
Z. PflErnähr. Düng., 1954, **67**: 163-6, 4 plates.

f Scheltinga, H.
Lood in grond, plant en dier. **(Lead in soils, plants and animals.)** [English summary ½ p.]
Landbouwk. Tijdschr., 1955, **67**: 153-64.

g Schuphan, W.
Qualitätsforschung bei pflanzlichen Erzeugnissen auf chemischer und physiologischer Grundlage. **(Research on the quality of plant products on a chemical and physiological basis.)**
Festschr. 25 jähr. Bestehen gärtn. Hochschulstud. Deutschland, 1954/55, pp. 175-89, bibl. 24.
The vitamin C content of apple varieties and factors affecting the nutritional value of vegetables are among points discussed.

h Schutt, K.
Einfache Pflanzen-Teste und Nährlösungs-Kontrollen I auf Stickstoff, Phosphor und Kalium; II auf Magnesium, Kalzium und Schwefel. **(Simple plant and nutrient solution tests, I for nitrogen, phosphorus and potassium; II for magnesium, calcium and sulphur.)** [English, French, Spanish summaries 5 lines each.]
Mitt. Klosterneuburg, Ser. A, 1954, **4**: 270-8, bibl. 9, and *Ser. B*, 1955, **5**: 76-83, bibl. 8.

i Sørensen, C.
Om kvaelstofforbindelser i planterne. **(On nitrogen compounds in plants.)** [English summary ¼ p.]
Horticultura, 1955, **9**: 65-9, 85-91.
A review of nitrogen metabolism in plants.

j Spoelstra, P. A.
Automatische temperatuurregeling in kassen met warmwaterverwarming. **(Automatic temperature control in glasshouses with hot water heating.)** [English summary 6 lines.]
Meded. Dir. Tuinb., 1955, **18**: 104-9, illus.

k STAPLES, M. W.
Stump removal—a résumé of effective methods.
Plants and Gdns, 1954/55, **10**: 270-3, illus., reprinted from *N. York Times*, 7 Nov., 1954.

l STEWARD, F. C., AND MILLAR, F. K.
Salt accumulation in plants: a reconsideration of the role of growth and metabolism.
Symp. Soc. exp. Biol. **8**, 1954, pp. 367-406, bibl. 56, illus.
Based partly on observations on the absorption of ^{137}Cs in various plants.

m TROCMÉ, S.
Quelques exemples de contribution de l'analyse des plantes au diagnostic des insuffisances de production des cultures. **(Some examples of the contribution of plant analysis to the diagnosis of inadequate crop yields.)**
Plant Analysis and Fertilizer Problems, [1955], pp. 111-20, I.R.H.O. Paris, being part of *Proc. 8th int. bot. Congr. 1954.*
Mainly from French research.

n WEBBER, E. R.
Maleic hydrazide as a plant-growth inhibitor.
World Crops, 1955, **7**: 179-83, bibl. 15, illus.
A review. [See also *H.A.*, 25: 104f.]

TREE FRUITS, DECIDUOUS.

General.

(*See also* 2516c, d, h, k, l, n, 3378, 3407.)

2413. NEL, R. I.
Deciduous fruit research. [Forming part of the Annual Report of the Secretary for Agriculture, Union of S. Africa, for the year ending 31 August, 1954.]
Fmg S. Afr., 1955, **30**: 156-9, 198-9.

Pomological investigations: lack of soil moisture during fruit bud differentiation and development most affected annual apricot production; the colour of Barlinka grapes was poor but yields were higher when pruning was done very early or very late; root pruning had a remarkable effect on grape colour; phosphates appeared to influence rooting depth of table grapes; an improved spray mixture for correcting Zn deficiency included zinc oxide. *Breeding:* 3 new strawberry varieties have been released; selection of grapes, guavas, apricots and apples continues. *Diseases:* some control of apricot bacterial canker (*Pseudomonas syringae*) has been obtained by organic Cu compounds; red lead and white lead paint were more effective in preventing *Stereum purpureum* entry into plum wounds than bordeaux mixture. *Entomology:* DDT cover sprays were more effective than poison baits in controlling fruit flies on peaches. *Cold storage and transportation:* a delay of 24 hours in pre-cooling peaches resulted in reduced incidence of woolliness; polythene wrappers and linings had a detrimental effect on peaches and plums during storage, but gave excellent results with apples and grapes; a 10% CO_2 gas storage concentration was the best for pears. *Chinkerinchees* [*Ornithogalum thyrsoides*]*:* N had a considerable influence on growth and bulb development; temperatures of 34–40° F. were effective for storage.

2414. BAGENAL, N. B.
History and development of the cultivated fruits. (Parts III, IV, V, VI.)
Ass. Agric. Rev., 1954, No. 24, pp. 21-8, No. 25, pp. 4-12, 1955, No. 26, pp. 8-17, No. 27, pp. 9-20, all illus.

A series of entertaining articles dealing with the introduction, varieties and importance in English fruit growing of plums (Part III), cherries (Part IV), peaches, apricots, figs, mulberries and vines (Part V), and soft fruits (Part VI). [For Parts I and II dealing with apples and pears see *H.A.*, 24: 2210.]

2415. INGRAM, J.
Fruit section.
Rep. Luddington exp. Hort. Stat. for 1953, 1954, pp. 6-11.

Further planting has increased the total experimental area under fruit to 43½ acres. An apple planting systems experiment was started and is described. In treatment of glasshouse red spider (*Tetranychus telarius*) on black currants, Schradan, CPBS and TEPP gave successful control in that order of effectiveness.

2416. FEDOROV, M. A.
Forest-orchard on the collective farms. [Russian.]
Sad i Ogorod, 1955, No. 1, pp. 57-9, illus.

An account is given of grafting cultivated varieties onto established wild apple and pear trees in the forest of a collective farm in the Ukraine. Trees more than 10 years old were cut back to 3–10 cm. long stumps onto which 2–5 scions were rind grafted. Younger trees were top-worked by the same method at the height of 100–120 cm. Grafted trees should not stand closer than 5–7 m. and their care should consist mainly in clearance of undergrowth and staking in early years. Varieties of apples and pears suitable for forest-orchard conditions are given.

2417. LONGLEY, R. P., AND HOPE, G. W.
Pears.
A.R. Nova Scotia Fruit Grs Ass. 1954, pp. 127, 129, 131-3.

Brief general comments are made on the following aspects of pear growing in Nova Scotia: production, spacing, rootstocks, manuring, diseases and pests, processing and varieties.

2418. KEMP, W. S.
Cherry growing in Central Otago.
N.Z. J. Agric., 1955, **90**: 49-60, illus.

Central Otago produces almost three-quarters of New Zealand's total crop of cherries. The soils used are the alluvial flats and gravelly fans formed by the Clutha River. Mazzard is the most common stock used. The main varieties grown and their blossoming and harvesting periods are listed; in general they are late-maturing.

Some plantations are netted for bird protection, and trees are spaced at 12 or 10 ft.; unnetted trees are spaced at about 18 × 18 ft. Pruning is aimed at producing an open centre or vase-shaped tree with a low head. Cultivation is reduced to a minimum, weed growth being allowed in the summer, and mulches often being applied during autumn. Other cultural and marketing aspects are briefly described.

2419. HARPER, R. S.
A study of canning peach growing in California.
J. Dep. Agric. Vict., 1955, **53**: 1-8, 39-44, 49-63, 78, 125-35, bibl. 31, illus.

The author spent May to November in California studying production methods and research developments concerning problems which appear to be limiting the per acre yield in the Goulburn Valley. Peach, apple and pear production areas in Oregon, Washington and British Columbia were also visited.

2420. FERREE, R. J.
South Carolina's peach industry adopts new ideas.
Bett. Crops, 1955, **39** (2): 21-3, 39-40, illus.

In South Carolina in recent years Elberta has dropped back from being the most important variety grown, and has been replaced by new varieties requiring shorter chilling periods. Hydrocoolers to remove field heat are being increasingly used, to enable more mature fruit to be transported greater distances. Captan and parathion have proved to be very valuable sprays for peach growers.

2421. GOOR, A.
The fig. [Hebrew, with English summary 1½ pp.]
[*Publ.*] *Minist. Agric. Israel*, 1955, pp. 70, bibl. 11, illus.

Fig production in Israel has declined in recent years, so that the present acreage is about 3,500–4,500. Most varieties grown are probably of local origin and do not need caprification. Climatic and soil requirements and cultural treatments are discussed. Fig drying is described.

Breeding and varieties.

(*See also* 2516a, f, g, j, p, r, s.)

2422. WAGENINGEN, INSTITUUT VOOR DE VEREDELING VAN TUINBOUWGEWASSEN.
Veredelingsdag fruitgewassen 1954. (**Fruit breeding day 1954.**) [English summaries.]
Meded. Inst. Vered. Tuinbouwgew. **59,** 1954, pp. 39.

The bulletin includes talks with discussions on apple variety requirements from the points of view of marketability and disease resistance, and those of the grower, consumer and processer.

2423. GUTIÉRREZ JIMÉNEZ, M.
Apuntes sobre el cultivo de árboles frutales en regiones altas. (**Notes on fruit growing at high altitudes.**)
Suelo Tico, 1954, **7**: 278-82, bibl. 6.

Lists are given of fruit varieties with low chilling requirements recommended by 3 United States experts for use at high altitudes in Costa Rica. The species concerned are plum, apple, cherry, pear, peach, loganberry and boysenberry, blueberry, strawberry, cherimoya, quince, vine, passion fruit, and nectarine. The names are also given of varieties of plum, apple, peach, and pear observed growing at high altitudes in Guatemala.

2424. LISAVENKO, M. A.
Species and varieties for orchards in regions of virgin land appropriation. [Russian.]
Sad i Ogorod, 1955, No. 3, pp. 43-7.

The areas concerned are in Siberia, mainly the Altay region and in Kazakhstan. European fruit varieties are unsuitable but some Central Russian apples, and apple and cherry varieties developed by Mičurin, grow well in prostrate form. Some types of apples and pears are also cultivated as free growing, multi-stemmed bushes. Other fruits discussed include a species of cherry, the Ussurian plum, plum cherry, strawberry, raspberry, gooseberry, black currant and vine.

2425. OVERCASH, J. P., AND OTHERS.
Pear varieties studied at 5 State locations.
Miss. Fm Res., 1955, **18** (1): 1, 8, illus.

Observations are recorded on the performance of pear varieties at 5 locations in Mississippi. The Orient variety has been most vigorous. Orient and Waite were very resistant to fire blight, showing less than 1% infection. Pontotoc and Baldwin have also shown resistance, whereas Garber, Kieffer and Wilder had more than 10% of the twigs infected and some LeConte trees were killed by fire blight. The largest fruit was produced by Orient, followed by Garber, Wilder, Kieffer, Baldwin, Waite and Pontotoc, in descending order. Among the new varieties raised in Tennessee, Ayres and Mooers have never shown any fire blight in Mississippi and Dabney and Hoskins have been highly resistant.

2426. SCHAER, E.
Die Birnensorte "Gorham". (**The pear variety Gorham.**)
Schweiz. Z. Obst- u. Weinb., 1955, **64**: 151-2, illus.

Tests were carried out at Wädenswil over a long period with the American pear Gorham, the characteristics of which are discussed. The satisfactory results obtained in these trials led to the recommendation of the variety for Swiss conditions.

2427. PLOCK, H.
Die Bedeutung des Fruchtsteines bei der Bestimmung von Marillensorten. (**Fruit stones as an aid in the identification of apricot varieties.**) [English, French, Spanish summaries 3 lines each.]
Mitt. Klosterneuburg, Ser. B, 1955, **5**: 51-6, illus.

The shape of the stone and its length: width: thickness ratio are valuable characteristics for the identification of apricot varieties. Six illustrated examples are given.

2428. JOHNSTON, S.
Notes on new peach varieties.
Quart. Bull. Mich. agric. Exp. Stat., 1954, **37**: 252-3.

Dixired, Dixigem, Southland, Redglobe and Redskin under test at the South Haven Experiment Station.

2429. Yeager, A. F., and Meader, E. M.
The Sunapee peach.
Fruit Var. hort. Dig., 1954, **9**: 58.

This hardy, yellow, freestone variety resulted from a cross between Oriol and a hardy white-fleshed peach originating from the northern Caucasus. It has just been introduced by the New Hampshire Agricultural Experiment Station.

2430. Mann, A. J., and Keane, F. W. L.
The Sue cherry.
Fruit Var. hort. Dig., 1954, **9**: 36-7, illus.

The Sue cherry, bred at Summerland, B.C., ripens about a week earlier than Napoleon, the fruit of the two varieties being similar in appearance. The tree has a vigorous growth and bears heavily.

2431. Redžić, M.
Prilog proučavanju smokava u crnogorskoj suptropskoj zoni. (Drugo, završno saopštenje.) **(A contribution to the study of fig varieties in the subtropical area of Montenegro. (Second, final report.))** [French summary 1 p.]
Arh. poljopr. Nauk., 1954, **7** (18): 42-67, bibl. 4, illus.

Descriptions and line drawings are given of a further 29 fig varieties grown around Bar. [For Part I see *H.A.*, 22: 3382.]

Propagation and rootstocks.

(*See also* 2516b, o.)

2432. Karnatz, H.
Das Verhalten sortenreiner Kernobstsämlinge im ersten und zweiten Lebensjahr als unveredelte Pflanze. **(The behaviour of pome fruit seedlings as unworked plants in the first and second year.)**
Gartenbauwiss., 1955, **1** (n.s.): 325-39, bibl. 6.

The performance of one- and two-year-old unworked seedlings, raised from the seed of 8 diploid apple and pear varieties respectively, was studied from 1949 to 1953. Records were taken also on the growth of seedlings resulting from controlled pollination and from mixed varietal seed. Although variability was generally high, it was often possible to identify the origin of leafy seedlings, especially in apples. Varietal differences in root development, mildew resistance and vigour were noticeable and a correlation between the last two characters was found to exist. No clear relationship could be established between vigour and root development in the first year. The performance of seedlings from 5 apple varieties and one pear variety was satisfactory, but no final recommendations can be made until the investigations on frost resistance have been completed.—Obstbauversuchsanst. Jork.

2433. de Haas, P. G.
Beiträge zur Sämlingsanzucht bei Kernobst. **(On the raising of pome fruit seedlings.)**
Festschr. 25 jähr. Bestehen gärtn. Hochschulstud. Deutschland, 1954/55, pp. 19-30, bibl. 6, illus.

It has been recognized that with pome fruit uniformity in seedling rootstocks largely depends on the source of the seed from which they are raised. The present study shows that uniformity can be further improved by grading the seed according to weight in a horizontal air current and by stratification under optimum conditions. These are a temperature of +3° C. during the first phase and of −0·5° C. to −3° C. during the second phase. In the interval the stratification material should be thoroughly removed from the seed. During the post-stratification period the seed is dried and thawed and after-dried at +3° C. immediately before sowing. In large-scale trials very encouraging results were obtained with a sowing machine which sowed individual seeds at a depth of 3 cm. at regular intervals within the row.—Tech. Hochschule, Hanover.

2434. Abramov, N. A.
The influence of some biological factors on the duration of the dormant period in apple and pear seeds. [Russian.]
Izv. Akad. Nauk S.S.S.R. Ser. biol., 1955, No. 1, pp. 53-66, bibl. 12.

An extensive study at Mičurinsk has shown that factors affecting the length of dormancy in apple and pear seeds include the pollinating variety [see also *H.A.*, 24: 1194], rootstocks and prevailing weather conditions during fruiting. The average length of dormancy of seeds of cultivated, large-fruited apples varies from 90 to 100 days. Pollination of large-fruited varieties with small-fruited species such as Kitaĭka and, in particular, a Siberian apple reduced the period of dormancy, and pollination of these species with cultivated varieties made it longer. The Ussurian pear had a similar effect on cultivated pears and *vice versa*. Small-fruited species used as rootstocks for either the male or the female parent also reduced the duration of the dormant period in the seed. Seed produced during a cool, wet summer had a shorter dormancy than that produced during a hot, dry one.

2435. Mann, A. J., and Keane, F. W. L.
Apple rootstocks in the southern interior of British Columbia.
Proc. Wash. St. hort. Ass. 1954, pp. 177-80.

The characters and requirements of the following seedling and clonal rootstocks are briefly presented: Columbia, McIntosh, Delicious, Winesap, Antonovka, Beautiful Arcade, Robusta No. 5, and Malling I, II, IV, VII, IX, XII and XVI.

2436. Banta, E. S.
Dwarf apple orchards are "growing up".
Amer. Fruit Gr, 1955, **75** (3): 20-1, 40-1, illus.

Notes are given on the behaviour of certain apple varieties on dwarfing Malling rootstocks in some American Experiment Stations and commercial orchards now that they have begun to produce.

2437. Roberts, A. N.
Control of growth and fruit production of apples by means of selected rootstocks.
Proc. Wash. St. hort. Ass. 1954, pp. 170-2, 174-6.
Roberts, A. N., and Hartman, H.
Dwarf trees outyield standard-sized ones.
Bett. Fruit, 1955, **49** (8): 6, 23-6. [Will appear as **T.P.892** of *Ore. agric. Exp. Stat.*]

An account is given of a study made at Oregon Agricultural Experiment Station in 1947/54 on the performance of the early-cropping Jonathan, Rome Beauty and Golden Delicious and the late-cropping Starking Delicious, Yellow Newtown and Gravenstein on M. I, II, IV, V, VII, IX, XIII and XVI and on mixed north-west seedling rootstocks. Questions discussed are the effects of the different rootstocks on tree size, pruning requirements, early fruit production (during the first 6 years naturally early croppers in general yielded more on vigorous stocks, and naturally late croppers on dwarfing ones), yields, biennial bearing (encouraged by IX and VII), and yield comparisons per unit area. The amount of pruning wood removed and the yield during the first 6 years after planting, and the tree size at the end of 6 years are shown graphically. Tables give (1) the average yearly production per tree of Golden Delicious and Starking Delicious on seedling and 6 Malling rootstocks during their first 7 years; (2) the yields of 5 varieties on IX planted 4 feet apart in hedgerows 12 feet apart; (3) the yields of Golden Delicious and Starking Delicious on IX, VII, vigorous (seedling) and XVI at supposedly adequate spacings for the mature orchard.

2438. Thorsrud, J.
Mellompoding av frukttre—et effektivt vern mot frostskade. (**Double-working of fruit trees for the prevention of frost damage.**)
Frukt og Baer, 1955, **8**: 5-12, illus.

This record of insolation and frost injuries to apple trees at the State Research Station, Kise, proves that double-working with hardy stem-builders is necessary in central Norway for the maintenance of healthy trees. Data illustrate the reduction in frost damage to Gravenstein that follows the use of Haugmann as an intermediate.

2439. Plock, H.
Über die Direktererziehungen in der Baumschule. (**Stem-builders without double-working.**) [English, French, Spanish summaries.]
Mitt. Klosterneuburg, Ser. B, 1955, **5**: 27-30.

In Germany, frost-susceptible apple varieties on hardy stem-builders were in recent winters observed to escape damage, while normally frost-resistant varieties were killed by the severe cold. To avoid double-working in the production of hardy trees it would be desirable to raise suitable seedling rootstocks to the height of a half-standard or standard tree. Of five frost-resistant varieties tested by the author only the seed of Roter Trierer Weinapfel yielded a progeny of sufficient uniformity.

2440. Lepage et Cie.
Porte-greffes réfractaires au puceron lanigère. (**Rootstocks resistant to woolly aphid.**)
Arboric. fruit., 1955, No. 14, pp. 2-3.

Some results are given from trials with 2 Merton Immune rootstocks on which several varieties were tested. Comparisons were made with trees on Malling II and IX and on their own roots. Average yields and trunk measurements are tabulated for Canada blanc, Belle de Boskoop, Reinette Clochard and Reinette du Mans on Merton Immune 779 and 793, and Malling II and IX. In general, varieties on Merton stocks showed earlier bearing and greater vigour than those on Malling stocks. Golden Delicious had greater vigour on Merton Immune 793 than on Malling II, but yields were similar. Yields from Starking, Shotwell and Blackfon on Merton Immune 793 were higher than on their own roots, but trunk diameter was about equal.

2441. Plock, H.
Die Sämlingsmyrobalane—ihr Wert als Unterlage. (**Seedling myrobalan—its value as a rootstock.**) [English, French, Spanish summaries.]
Mitt. Klosterneuburg, Ser. B, 1955, **5**: 30-1.

Myrobalan seedling is not recommended as a rootstock for peach and apricot, but it is useful as a rootstock for plums on light, dry soils.

2442. Bernhard, R.
Le pêcher amandier. (**The peach almond hybrid.**)
[*Publ.*] *Stat. Rech. vitic. arboric. fruit. Sud-Ouest*, undated, pp. 71-81, illus.

Several years' tests with peach almond hybrids have shown that seedlings of this cross are very variable in character. Some types have shown desirable qualities as a peach rootstock, but are difficult to propagate. One selection, however, F1 (R1 × S 557) 1, can be propagated fairly easily by layering and by woody cuttings. Current tests have so far indicated that trees on this stock have good vegetative vigour. Trials are being continued.

2443. Neumann, D.
Über die Variabilität der Wuchsleistung von Obstgehölzen in der Baumschule. (**The variability of growth increments of fruit wood in the nursery.**)
Züchter, 1955, **25**: 140-53, bibl. 16.

In variability studies on year-old apple, pear and plum varieties on different rootstocks, shoot length and diameter were measured and analysed. The variability in growth increment (shoot length/cm. shoot diameter) of year-old grafts was relatively small, thus plots of 20–25 plants are suggested for nursery experiments. A negative correlation was found to exist between the variation coefficient and mean in plots of apple, pear and plum grafts. Variability was influenced by habitat; with more favourable environment there was less variability with increasing growth increments. Single plant experiments are not recommended for nurseries on practical grounds. Evaluation of plot experiments is not usually satisfactory, as analysis of frequency distributions shows variations from corresponding normal distributions.—Inst. Obstb., Marquardt, Potsdam.

2444. Garner, R. J., and Hatcher, E. S. J.
The influence of source and growth substance on the behaviour of apple and plum cuttings.
J. hort. Sci., 1955, **30**: 116-28, bibl. 12.

Three rootstock varieties, Myrobalan B, Brompton and Crab C, were used in a study on rooting behaviour of hardwood cuttings. Apical, middle and basal cuttings from layer and hedge shoots were planted in open soil, in autumn and spring, with and without growth substance treatment. Layer cuttings were superior to their hedge counterparts, with the position gradient declining towards the shoot apex. The strong rooting of basal layer cuttings was associated with root-inducing conditions when still attached to the source plant. Autumn planting of the plum stocks was much superior to spring planting, but non-etiolated Crab C cuttings always rooted poorly. Crab C cuttings showed the strongest power of survival in the unrooted state, and surviving cuttings rooted successfully in the subsequent winter dormant period. The growth substance IBA did not achieve first-year rooting of Crab C; it was most beneficial with Brompton and least necessary with Myrobalan B. When the rooting of non-etiolated Myrobalan B cuttings was sufficiently high, the disparity between hedge and layer shoots diminished and hedge source plants appeared to be ideal. The rooting gradient up the shoot of Myrobalan B was partly determined by differential tolerance of the harsh environment of a delta soil. On loam this gradient was reversed when thick source shoots were used.—E. Malling Res. Stat.

2445. Hartmann, H. T.
Auxins for hardwood cuttings.
Calif. Agric., 1955, **9** (4): 7, 12-13, illus.

During 1952 and 1953 various hormone and storage treatments were applied to hardwood cuttings of 5 tree-fruit species. With the rootstock Marianna 2624 (probably *Prunus cerasifera*×*P. munsoniana*) the best results were generally obtained when cutting material, taken at any time during the dormant season, was stored in moist peat moss at 32° F. until 1 month before it was to be planted; the material was then made into cuttings, about 8 inches long, which were stood in a 45 p.p.m. solution of IBA for 24 hours; and finally the treated cuttings were stored in well-ventilated boxes, loosely packed in moist wood shavings and peat moss, and were held for 30 days at 50° F. before planting out in the nursery. With the Mission olive a similar procedure was effective except that storage at 32° F. before hormone treatment proved detrimental and the best concentration of IBA was 15 p.p.m. With quinces, there were marked differences in rooting between 8 varieties tested, but neither IBA nor the pre-planting storage was beneficial. Attempts to root Stockton Morello cherry and Malling-Merton 793 apple were unsuccessful. In 1954 comparisons made between basal, intermediate and terminal cuttings of Marianna 2624 and several quinces showed the basal cuttings to be markedly superior in rooting ability.

Growth phenomena.

(*See also* 2516i, 2727, 3143.)

2446. Stanković, D., and Bulatović, S.
Effects of some meteorological factors on the ripening and fruit characteristics of some standard peach varieties grown in the region of Smederevo. [Serbian with English summary 1 p.]
Rev. Res. Work Fac. Agric. Belgrade, 1954, **2** (1): 134-47, bibl. 7.

Results of a 3-years' study show that prevailing weather conditions, in particular temperature and rainfall, affect the length of the period between blossoming and fruit maturity in a given peach variety. Of 12 varieties examined the biggest difference between the time required from blossoming to maturity occurred in the variety Alexander's Early (24 days) and the smallest in Mayflower (8 days). It was found that a high temperature sum prolongs the period from blossoming to maturity since it has a detrimental effect on fruit development. The temperature sum, however, has a direct influence on ripening which is determined by the meteorological conditions of the regions in which the varieties were developed. Physical characteristics and chemical composition of the fruits were also subject to annual variations due to different weather conditions and varietal reactions.

2447. Stanković, D., and Bulatović, S.
The influence of temperature on blooming of peaches. [Serbian, with English summary ½ p.]
Rev. Res. Work Fac. Agric. Belgrade, 1954, **2** (2): 206-13, bibl. 26.

Peaches grown in the Smederevo region are divided into early and late blossoming varieties. Observations over 8 years have shown large differences, amounting to 15–29 days, in the beginning of the blossoming period of the same varieties due to different weather conditions. The most important meteorological factors affecting the beginning of blossoming are the total temperature sum and the average monthly temperature during the period January to March, and the number of cold days (below 5° C.) during dormancy.

2448. Mišić, P. D.
Fenološko-fenometriska izučavanja cvetanja nekih sorti jabuka. **(Phenological and phenometrical studies on the blossoming of certain apple varieties.)** [English summary 1 p.]
Arh. poljopr. Nauk., 1954, **7** (15): 50-66, bibl. 19.

Time and duration of blossoming of 17 apple varieties were studied in 2 localities in Serbia during the period 1951–1953. The data show that blossoming is affected by both hereditary characteristics of the variety and prevailing weather conditions. Meteorological conditions enhancing transpiration, such as high temperature, low humidity and wind, and warming up of the soil as the result of low precipitation shorten the blossoming period and cause nearly all varieties to bloom at approximately the same time. Factors limiting transpiration and restricting the warming up of the soil prolong the blossoming season. The course of bud burst in the inflorescence is described, and the order and duration of flowering in the varieties studied are tabulated.

2449. Gorter, C. J.
Photoperiodiciteit van de bloei van appelbomen. **(The photoperiodicity of flowering in apple trees.)** [English summary ½ p.]
Meded. Dir. Tuinb., 1955, **18**: 152-8, bibl. 4, illus.

Young potted trees of Jonathan and Yellow Transparent on M. IX were grown in normal day, long day of 8 hours daylight and 8 hours artificial illumination, and short day of 8 hours daylight. Flowering was recorded during 3 seasons, but there was no difference between the long and short day groups. In both long and short day groups some of the mixed buds developed into vegetative shoots in the same year, but failed to form flower clusters the following year. This phenomenon was probably caused by a slight difference in temperature between the darkroom and outside, which prevented these buds from becoming dormant.—Lab. Tuinbouwplantenteelt, Wageningen.

2450. Schander, H.
Untersuchungen über die Gestalt der Frucht bei Kernobst. (**Studies on the shape of the fruit in pome fruit.**)
Gartenbauwiss., 1955, **1** (n.s.): 313-24, bibl. 18, illus.

In this paper read at a botanical meeting in September, 1954, the author gives an account of his statistical studies on asymmetry and on the length: breadth ratio in apple and pear fruits. Photographs and diagrams are presented to illustrate: range of shape irregularity in apple fruits of the same weight; variation in the length: breadth ratio in apples and pears; seed distribution in irregularly shaped apple fruits; average weight of single seeds and average total seed weight in individual locules of irregular fruits; influence of seed distribution, light and gravity on fruit shape in apples; relations between length: breadth ratio, seed number and fruit weight in apples and relations between length: breadth ratio and seed number in pears. An interpretation of the figures in physiological terms is attempted.—Tech. Hochschule, Hanover.

2451. Loewel, E. L., and Karnatz, H.
Leistungsprüfungen bei sortenreinen Kernobstsämlingen auf verschiedenen Standorten. (**The effect of locality on the performance of pome fruit seedlings raised from uniform seed.**)
Reprinted from *Obstbau*, 1955, Vol. **74**, No. 3 and 4, pp. 7.

Germination of seed from certain apple and pear varieties and subsequent growth of the seedlings was studied in six localities in Western Germany. The tabulated data show that a heavy soil and relatively high spring temperatures have an adverse effect on germination, while the warmer locations are favourable to seedling growth in the presence of sufficient soil moisture. Low summer temperatures in conjunction with excessive soil moisture, on the other hand, check the growth of seedlings, especially of pears. Thanks to the selection work carried out on seedling rootstock parents in apples the performance of apple seedlings proved fairly uniform, irrespective of the varietal source of seed. In pears seedlings from Kirchensaller Mostbirne greatly surpassed other varieties in vigour and health.

2452. Ullah, H.
The differentiation of flower bud of the peach (*Prunus persica*) in the Punjab.
Punjab Fruit J., 1954, **18** (68/69): 34-41, bibl. 19, illus.

Flower bud differentiation was investigated in a double-flowered variety at Lyallpur and in C. O. Smith at Palampur in 1945/47. The time of differentiation of flower-buds at Lyallpur was found to range from the first week of August to late September and at Palampur from the first to the third week of July. The difference in season was attributed to climatic factors. The flower buds were observed to undergo steady development during the winter months. Pollen formation within the pollen-mother cells was also seen to occur in the dormant period. Ovule formation occurred in late winter. [From author's summary.]

2453. Baldini, E.
Contributo allo studio delle cultivar di ciliego della provincia di Firenze. I. Notizie storiche e ricerche sulla biologia fiorale. (**Contribution to the study of the cherry varieties in the province of Florence. I. Historical notes and research on floral biology.**)
Riv. Ortoflorofruttic. ital., 1955, **39**: 105-31, illus.

The floral biology of 15 early, midseason and late varieties of sweet cherry in the province of Florence was investigated. After a historical note on varieties information is given on (1) flowering dates of the 15 varieties in 1953 and 1954; (2) the progress and duration of the different stages of flowering in an early and a late variety in March/April, 1953, and the pollinating agents (83% bees); (3) analysis of pollen collected from bees at various times of day in flight on cherry trees or on entering the hive during the cherry flowering season; (4) self sterility and intercompatibility in the 15 varieties. All the varieties were completely self-sterile; in both open and artificially pollinated branches the fertilization rate varied from year to year, depending on climatic factors; and the fertilization rate was lower in artificially than in open pollinated branches, partly owing to the fact that pollination occurred once in the former and many times in the latter. Notes are given on the intercompatibility of the 15 varieties studied.

2454. Trevisan, M.
L'azione del freddo su piante di *Morus alba* L. durante i mesi di Settembre-Ottobre e successivo sviluppo in serra calda. (**The effect of chilling mulberry plants in September/October on their subsequent development in a heated greenhouse.**) [English summary 4 lines.]
Ann. Sper. agrar., 1955, **9**: 383-400, bibl. 9, illus.

Defoliated pot plants of 5 mulberry varieties were placed in a cold greenhouse at 2–3° C. for 3 different periods at 3 different dates in September/October, were pruned either just beforehand or just afterwards, and were subsequently placed in a warm greenhouse with day and night temperatures of 25° C. and 15° C. respectively. Control plants, not subjected to chilling, were placed in the warm greenhouse on the same dates as the treated plants. Treatments accelerated flushing which occurred 20 days (average) after placing in the warm greenhouse compared with 40 in the controls. It improved the budding rate, giving 47, 34 and 56% in plants whose chilling began on 1 and 21 September and 12 October, compared with 18, 25 and 49 in the controls. Earliest flushing resulted from 20 days' and 30 days' treatment respectively in the 2 earlier-treated and the last-treated groups. Highest % budding was given by 40 days' and 30 days' treatment respectively in the first 2 and third groups. Earliest flushing and highest budding rate resulted from pruning after chilling in the first group and from pruning before chilling in the 2 later groups. The Muki variety flushed earliest and had the highest budding rate.—Staz. bacolog. sper., Padova.

2455. Kothari, D. S., and Bhandari, R. C.
A note on the elastic constants of fresh twigs.
Sci. and Cult., 1955, **20**: 452.

The elastic constants of fresh and dry twigs of a number of woody species were determined from the formula Y/n, where Y denotes Young's modulus and n the modulus of rigidity, as follows: *Prunus persica* 33 (fresh) 29 (dry), *Morus alba* 27 and 28, *Inga dulcis* 18 and 22, *Casuarina* sp. 50 and 55, *Psidium guajava* 22 and 25, *Myrtus* sp. 39 and 35 and *Phyllanthus emblica* 44 and 48.—Maharaja's Coll., Udaipur.

2456. Asselbergs, E. A. M.
Studies on ascorbic acid synthesis in apple leaves.
Diss. Abstr., 1955, **15**: 195-6, being *Publ.* 10738 of 165 pp.

A number of substances were introduced into apple leaves and their effect on ascorbic acid content was studied under various conditions of light intensity, CO_2 concentration of the atmosphere, and temperature. At high light intensity glucuronolactone, glucose and fructose caused an increase in ascorbic acid content. Organic solutions, adjusted to pH 3·5 or 5·5, caused decreases in ascorbic acid concentrations; at the same time there was an increase in 2,3-diketo-1-gulonic acid. Experiments with C^{14}-labelled CO_2 indicated the light sensitivity of ascorbic acid formation. During hot water extraction of apple leaves up to 90% of the total ascorbic acid content was destroyed, while there was an increase in the oxalic acid content of the extract.

Spraying for cultural purposes.

2457. Batjer, L. P.
Precautions in the use of 2,4,5-TP as a stop-drop spray in Central Washington.
Proc. Wash. St. hort. Ass. 1954, pp. 79-80.

At 10–20 p.p.m. 2,4,5-TP is an excellent stop-drop spray for apples, but the higher concentrations used for aircraft application can injure lateral buds on terminal shoots. Spray drift from both dilute and concentrated applications may cause premature ripening and calyx-end breakdown in Bartlett pears.

2458. Rogers, B. L., and Batjer, L. P.
Effects of 2,4,5-T on size, maturity, and drop of apricots.
Proc. Wash. St. hort. Ass. 1954, pp. 81-2, bibl. 2.

In experiments in 1952/54 on Moorpark apricots spraying with 50 p.p.m. 2,4,5-T increased fruit size by 8–15%, advanced maturity by 2–4 days and increased yield by 68% by reduction in fruit drop. The best time of application is within a week from the beginning of stone-hardening.

2459. Bradley, M. V., and Crane, J. C.
The effect of 2,4,5-trichlorophenoxyacetic acid on cell and nuclear size and endopolyploidy in parenchyma of apricot fruits.
Amer. J. Bot., 1955, **42**: 273-81, bibl. 36, illus.

2,4,5-trichlorophenoxyacetic acid applied as a spray to apricot trees at the beginning of pit-hardening had been shown previously to cause approximately 50% increase in flesh volume over that in controls [see *H.A.*, 23: 246, 3860; 24: 185]. In the work reported here the cytological effects of the auxin leading to increased fruit volume were studied. The number of layers of ground parenchyma in the mature mesocarp was found to be approximately the same in treated and control fruits. Obviously 2,4,5-T stimulated little if any division in the parenchyma. Relative "volumes" of cells and nuclei in the outer mesocarp region were determined in almost mature treated and control fruits. The average cell volume was 57% greater in treated than in control fruits. The increase in flesh volume of treated fruits was concluded, therefore, to be the result of stimulated cell enlargement. An even greater difference existed in nuclear size than in cell size. Investigation of chromosome numbers in mitoses (induced by wounding) in mesocarp parenchyma at two different stages of fruit development revealed that the treated fruits contained many more cells of the high polyploid classes than did the controls; the occurrence of 64-ploid dividing cells in treated fruits and not in controls is but one indication of this. [From authors' summary.]—Univ. Calif., Davis.

2460. Davison, R. M.
The use of chemical thinning sprays on apple trees in New Zealand. I. Preliminary experiments in Hawke's Bay and Nelson.
N.Z. J. Sci. Tech., Sect. A, 1955, **36**: 506-15, bibl. 8.

DNOC, ANA and MCPA were tested on 3 varieties for 2 seasons. Both DNOC and ANA proved efficient thinning agents, but MCPA was unsatisfactory. In Hawke's Bay suitable concentrations of both DNOC and ANA on Sturmer in 1951–52 gave a satisfactory commercial result, but in Nelson most treatments tended to overthin. Jonathan seemed slightly easier to thin than Sturmer, whereas Dougherty was much more difficult. Effective treatments in general notably increased fruit size on all varieties. All chemicals tested gave some foliage injury, the severity of which depended on concentration, time of application, variety, and tree vigour. In Hawke's Bay early thinning by DNOC and ANA on Sturmer and Dougherty induced a heavier blossoming in the following year on sprayed trees than on check trees. [From author's summary.]—Fruit Res. Stat., D.S.I.R., Auckland.

2461. Longley, R. P.
Fruit thinning and its effect in promoting annual bearing in apples.
A.R. Nova Scotia Fruit Grs Ass. 1954, pp. 147-50.

Spraying with 25 p.p.m. NAA 3 weeks after full bloom broke the biennial bearing habit of McIntosh and considerably improved regularity in Fameuse. McIntosh yields for 1951/54 were 481, 23, 477 and 715 lb. per tree when chemically thinned in 1953 and 488, 13, 534 and 268 when left unthinned. Fameuse thinned and unthinned yields were 728, 16, 382, 343 and 747, 14, 572, 78 respectively. The 1954 yields from the plots treated in 1953 were about equal to an average crop. The total yield for 1953 and 1954 was appreciably higher in the treated plots.—Kentville Exp. Stat., Nova Scotia.

2462. EDGERTON, L. J., AND HOFFMAN, M. B.
Effect of N-1-naphthyl phthalamic acid on fruit set of peaches.
Science, 1955, **121**: 467-8, bibl. 4.

Tests with NPA at various concentrations suggest that this chemical is superior to dinitro compounds as a thinning spray for peaches, since its action is not dependent upon a particular stage of bloom. Work on NPA as a thinning agent for peaches and perhaps other fruits is being continued.—Cornell Univ.

Fertilizers and soil management.

(*See also* 2386, 2411y, 2516e, t, 2591.)

2463. PROEBSTING, E. L., AND BROWN, J. G.
Leaf analysis of differentially covercropped deciduous fruit trees.
Hilgardia, 1954, **23**: 125-53, bibl. 6.

The results are given of an investigation on the effects of 5 different cover crops on N, P, K, Ca and Mg contents in the leaves of plum, peach, apricot and pear. Briefly, 3 clean-cultivated controls were compared with single treatments of an annual summer legume, an annual winter non-legume and alfalfa sod in duplicate plantings.

2464. GRUPPE, W.
Vergleichende Blatt- und Bodenuntersuchungen in Apfelplantagen und -baumschulen unter besonderer Berücksichtigung von Kalium und Magnesium. (**Comparative leaf and soil analyses in apple orchards and nurseries, with special reference to potassium and magnesium.**)
Gartenbauwiss., 1955, **1** (n.s.): 291-312, bibl. 28.

Methods of sampling leaves for foliar diagnosis were studied and the following conclusions were reached: To obtain comparable results samples must be taken (1) from non-bearing trees or trees in their off-year, (2) from a similar position on the tree and (3) within a short space of time, significant differences in composition having been shown to occur after a lapse of 3 weeks. Varietal, rootstock and soil characteristics must also be taken into account. The analytical results from 3 years' experiments with several apple varieties are fully tabulated.—Tech. Hochschule, Hanover.

2465. SATŌ, K., ISHIHARA, M., AND HARADA, R.
Studies on leaf analysis of fruit trees. Parts 5-8. [Japanese, with English summaries.]
Bull. nat. Inst. agric. Sci. Hiratsuka (*Ser. E*) **3**, 1954, pp. 139-219, bibls, illus. [For abstract of Parts 1-4 see *H.A.*, 24: 1208.]

(5) *Leaf analysis in grape vineyards.* Leaf contents of N, P, K, Ca and Mg were studied during foliation and fruiting. (6) *Leaf analysis in Japanese persimmon orchards.* N, P and K decreased as the season advanced. No clear relationship existed between fertilizer rate or tree age and leaf mineral content but leaf K was higher in plots receiving higher K and leaf Ca was lower in trees over 25 years old. Optimum leaf contents are considered to be about 2·3% N, 0·12% P, 1·5% K, 1·0% Ca and 0·25% Mg dry weight. (7) *The effects of various amounts of N, P and K on growth and leaf composition in young Satsuma orange trees.* Sand-culture and field studies showed that the optimum leaf concentrations (in September) are 2·8–3·0% N, 0·15–0·16% P and 1·08% K dry weight. The optimum concentrations for the nutrient solutions were 60–100 p.p.m. N, 5·0 p.p.m. P, 10·0 p.p.m. K. Mineral absorption by the plant (which was greatly influenced by the rate of growth) and mineral content of leaf, shoot, trunk, and large and small roots increased in proportion to the concentration of the nutrient solution, the rate of change for the different parts of the tree being different. (8) *The effects of various amounts of N, P and K on growth and leaf composition in young Japanese pear trees* (*Pyrus serotina*). Sand-culture studies showed that the optimum leaf concentrations (in August) are 2·42–2·65% N, 0·14% P and 1·35% K dry weight. The optimum concentrations for the nutrient solution were 100 p.p.m. N, 5 p.p.m. P and 15–30 p.p.m. K. The mineral contents of leaf, shoot, trunk, and large and small roots increased in proportion to the concentration of the nutrient solution, the rate of change being different for the different parts.

2466. WALLACE, T.
Manuring of fruit crops.
Growmore Bull. Minist. Agric. Lond. **4,** reprinted with illustrations 1953, pp. 12, illus.

The bulletin is divided into 3 sections, dealing with symptoms of nutrient deficiencies, practical field problems of manuring, and the manuring of particular fruit crops. Photographs of some minor element deficiency symptoms on apple, cherry and pear leaves and shoots, and on apple fruits have been included.

2467. WEISSENBORN, K.
Düngung und Nährstofftransport beim Boskoop. (**Manurial responses and transport of nutrients in Boskoop.**)
Mitt. ObstbVersuchsringes Jork, 1955, **10**: 45-53, bibl. 4.

Boskoop was chosen for the experiment as being particularly susceptible to manurial treatment. The more important findings from a 5-year trial are: (1) The potassium content of the leaf was less affected by the potassium content of the soil than by soil nitrogen which had an antagonistic action. (2) The higher rates of nitrogen applied (60–120 kg./hectare) reduced (*a*) the content of photosynthetic products and of potassium in the leaf, (*b*) the weight of individual fruits and (*c*) storage losses; maximum yields were obtained with an N dosage of 60–80 kg./hectare. (3) Low fruit set, blossom thinning and, above all, ringing increased both storage losses and the content of photosynthetic products and potassium in the leaf. (4) In on-years leaf nitrogen was high and the content of potassium and photosynthetic products in the leaf was low, the shoots making little secondary but vigorous elongation growth. The reverse was true in off-years. (5) Nutrient supply was affected by the position of the branch. (6) Severe pruning preserved the photosynthetic products, reduced nitrogen requirements and controlled biennial bearing. (7) Trees with a tendency to biennial bearing should receive nitrogen only in off-years. (8) Excess of leaf K_2O should be corrected by higher N applications.

2468. LOEWEL, E. L., AND WEISSENBORN, K.
Hinweise für die mineralische Düngung der Obstbäume. **(Recommendations on mineral fertilizers for fruit trees.)**
Phosphorsäure, 1954, **14**: 352-4.

On the basis of their experience, the authors recommend applications per hectare of 120 kg. potash as potassium magnesium sulphate, 60 kg. of phosphoric acid as basic slag, and 60 kg. of N as calcium cyanamide. The mixture is best applied at the end of October. Magnesium is especially important on light sandy soils, on which apples have often shown Mg deficiency. In general the potash content is good in old orchards, but is less so on arable land, and poorest on sandy soils. Nitrogen manuring appeared to be especially important in old cherry orchards, and an additional application of 100 kg. of lime ammonium nitrate may be given before flowering. Manuring in grassed-down orchards should be related to promoting grass growth as well as tree growth. There was some advantage in nutrient penetration, when fertilizers were applied in furrows cut in the grass surface, rather than broadcast. Nitrogen may be omitted from the complete fertilizer formula when farmyard manure is given, to be applied instead before flowering. Dressings of clay soil are also recommended, to which peat, after use as bedding material or substrate for liquid manure, will add the necessary organic matter. Old orchards generally had a lower pH than younger plantations, and winter applications of magnesium quicklime are recommended as satisfactory.—Obstbauversuchsanstalt, Jork.

2469. GERICKE, S., KURMIES, B., AND BÄRMANN, C.
Untersuchungen über die Nährstoffverhältnisse in Obstbäumen. **(Investigations on the nutrient status of fruit trees.)**
Phosphorsäure, 1954, **14**: 363-94, illus.

Studies were made on the weight and nutrient ratios of cherry, peach and apple trees during the first 4 years after planting. During this period the total tree weight of cherry and apple increased about 20 times, the greatest increase being by the crown. The trunk formed about 20% of the total tree, while the roots of peach and apple formed 20%, and those of cherry formed 30%. There was a constant increase in nutrient uptake in all tree parts except the leaves. In general cherry leaves had slightly higher nutrient contents than those of apple and peach. During the 4-year period, N and P_2O_5 uptake in cherry and peach increased about 26 times; in apple the nutrient uptake was much slower. The average nutrient ratio in all trees was $N:P_2O_5:K_2O:CaO = 1:0{\cdot}3:1:1{\cdot}3$. There was more CaO and P_2O_5 in proportion to N in apple than in cherry and peach. Comparisons with trunk girth and nutrient uptake showed that these were greater in rapidly developing bush trees than in older standard trees.—Landw. Versuchs. Thomasphosphat-Erzeuger, Essen-Bredeney.

2470. BATJER, L. P.
Nutrient utilization of apple and peach trees as related to fertilizer practices.
Proc. Wash. St. hort. Ass. 1954, pp. 68-72.

The annual utilization of nitrogen, phosphorus and potassium per tree and per acre by mature apple and peach trees was calculated from data obtained from the analysis of the tissues of trees in central Washington orchards receiving different fertilizer treatments.

2471. KRÜGERKE, W.
Erfahrungen über die Düngung der Obstbäume. **(Experience in fruit tree manuring.)**
Phosphorsäure, 1954, **14**: 359-62.

In 1950 a phosphoric acid manurial trial was started with Cox, Jonathan and Goldparmäne on I and IX. Increased P_2O_5 applications had had no effect on trees on I by the third year, but had clearly influenced trees on IX. Yields of Cox and Jonathan were increased with P_2O_5 applications. The highest Cox yields were given at applications of 60 kg./hectare P_2O_5; highest yields of Jonathan were obtained at 90 kg./hectare P_2O_5.

2472. DEPARDON, L., AND BURON, P.
Fumure des pommes. **(The manuring of apples.)**
Ann. agron., 1954, **5**: 879.

For the layout of the experiment see *H.A.*, 23: 2611. Average fruit yields per apple tree (Reinette du Mans) in 1953 were: Solid fertilizer (1: 1: 2): 125 kg.; liquid fertilizer (1: 1: 2 and 1·5: 1: 2): 116 kg. and 97·5 kg. respectively; controls: 82 kg. These figures, in conjunction with the figures for total yields since 1945, suggest a slight superiority of the solid over the liquid fertilizer.—Blois.

2473. GAYFORD, G. W.
Apple fertilizer experiment at Croydon.
J. Dep. Agric. Vict., 1955, **53**: 115-18, illus.
Manuring deciduous fruit trees.
Fruit World, Melbourne, 1955, **56** (2): 21.

In 1946 after 10 years of a fertilizer trial the health and yield of Jonathan and Democrat trees receiving only sulphate of ammonia was poor. Trees which had received a 2: 2: 1 complete fertilizer showed satisfactory growth. Potash applications from 1946 improved health and yields on low yielding plots, while lime and magnesium sulphate reduced health and yields. Extra potash applications to trees receiving complete fertilizer did not improve health, yield or leaf potash further. Lime or magnesium sulphate applied to complete fertilizer plots seriously reduced leaf potash. Yearly applications of 4 lb. potash since 1946 have considerably reduced leaf Mg.

2474. EAVES, C. A., AND LEEFE, J. S.
The influence of orchard nutrition upon the acidity relationships in Cortland apples.
J. hort. Sci., 1955, **30**: 86-96, bibl. 15.

A technique is described for the rapid estimation of titratable acidity in apples. Cortland apples picked on 3 different dates were found to have significantly less acid at the last date, but there was no difference in acid loss in storage at 34° F. for 5 months. Acid content was positively correlated with leaf-K; fruit from trees receiving K had a significantly higher acid content than apples from untreated and N-treated plots. There was a significant reduction in acid content due to application of dolomitic limestone. Acid loss was positively correlated with N/K ratio in leaves. Fruit from N and P treated plots was significantly higher in acid loss than from untreated and potash-treated plots. No relation was found between liming treatments and acid loss.

Observations over 3 years showed that acid content was positively associated with acid loss and that seasonal precipitation influenced these relationships.—Dom. exp. Stat., Kentville, N.S. [From authors' summary.]

2475. O'Rourke, E. N., Jr.
A study of the effects of season, variety, light, and certain inorganic elements on the zinc nutrition of the apple.
Diss. Abstr., 1955, **15**: 187, being *Publ.* 10748 of 164 pp.

The uptake and utilization of Zn was studied in the field, and in sand and water cultures in the greenhouse. Five apple varieties were studied, but only Red Delicious showed a consistent varietal effect during the 2 seasons of trials. In general the absolute amount of Zn in the leaves increased in early summer, and then decreased until the last sampling date in mid-August. Zn appeared to depress the uptake of Fe and N from solutions, while Fe and N showed the reciprocal effect on Zn. Nitrogen apparently depressed uptake and accumulation of Zn from the soil. A dormant spray of zinc sulphate in the field was more effective than soil treatment in increasing the Zn content of leaves in the following year. High light intensity was associated with greater Zn accumulation by tomato seedlings in nutrient solutions than low light intensity. The intensity of light influenced Zn distribution within tomato seedlings, the effect depending upon length of the period of exposure to light.

2476. Crowe, A. D., Ricketson, C. L., and Smith, G. R.
Nutrient sprays for apples.
A.R. Nova Scotia Fruit Grs Ass. 1954, pp. 109, 111-14.

Experiments in urea foliage spraying were made under the control of the Nova Scotia Department of Agriculture and Marketing in 1951/54. In one apple variety [unspecified] the average [annual?] yields per tree in 1952/54 were 2·3 boxes with urea only (at 1·34 lb. N per tree), 3·18 with urea plus ground applications of mixed fertilizers (totalling 2·54 lb. N) and 1·76 with soil applications only (2·82 lb. N), and the corresponding figures with 2 other varieties were 4·42, 3·21, 2·89 and 3·93, 4·45, 3·81 respectively. With Delicious the yield per tree per lb. N [for an unspecified period] was 12·3 boxes with urea alone, 5·0 with urea plus soil application, and 4·1 with soil application alone. Corresponding figures for McIntosh and Spy were 19·2, 8·0, 5·0 and 29·2, 11·6, 13·3 respectively. Three or 4 weekly urea (46% N) sprays will be required at 6 lb. per 100 gal. and 10 gal. per tree between 7–10 days before blossoming and the 3rd week in June. In practice a part of the tree's N requirements is normally supplied by soil application. Notes are given on the compatibility of urea with other spray materials.

2477. Walker, D. R.
Foliar and soil applications of nitrogen to sour cherry and magnesium to apple trees.
Diss. Abstr., 1955, **15**: 188, being *Publ.* 10756 of 207 pp.

Foliar sprays of urea to sour cherry were compared with soil application of ammonium nitrate, but large differences were not observed. Some spray injury was caused by biuret impurities in the urea. Magnesium was applied to the leaves and soil in studies on Mg deficiency of apple. Mg sequestrene sprays were of little value in controlling deficiency symptoms or increasing leaf Mg. Sprays of Epsom salts with urea were the most satisfactory in maintaining a high Mg level in the leaf. Applications in June and July were equally effective. Soil applications of dolomitic limestone plus kieserite resulted in a small increase in leaf Mg after only 1 year. Trees receiving a mulch showed a large increase in leaf N and chlorophyll, but only a small increase in leaf Mg. Rototilling was of little value in increasing leaf content of the minerals studied; it did, however, increase the amount of available soil Mg after lime applications. In greenhouse studies about 20% of magnesium sulphate applied was absorbed by McIntosh leaves within the first hour. 75% of an application of a 2% urea solution was absorbed within 48 hours. Magnesium sulphate decreased the rate of urea penetration, its effect increasing with concentration. Rapidly penetrating forms of Mg caused spray injury when the Mg equivalent of 5% magnesium sulphate was used. Magnesium chloride and acetate at lower concentrations than this penetrated more rapidly than magnesium sulphate. Absorption of Mg by the upper and lower leaf surfaces was equal in the time intervals studied. Rewetting of the leaves after magnesium sulphate applications did not increase the Mg percentage absorbed.

2478. Sato, K., Ishihara, M., and Harada, R.
Studies on foliar sprays of phosphates for fruit trees. I. Some effects of foliar sprays of mono-ammonium phosphate on peach, pear, persimmon, grape vine and Satsuma orange seedlings. [Japanese, English summary ⅓ p.]
J. hort. Ass. Japan, 1954, **23**: 159-64, bibl. 5, illus.

Foliar sprays of mono-ammonium phosphate, at concentrations of 0·5, 1·0 and 1·5%, were applied to seedlings of peach, pear, persimmon, grape vine and Satsuma orange grown on P-deficient soil. Orange was sprayed 12 times, and peach, pear and persimmon were sprayed 8 times, starting in June, while vine was sprayed 6 times starting in July. The seedlings were harvested and weighed in August or October. Plant growth was increased by the sprays, the effective concentrations being 1·0% for peach, pear and orange and 0·5–1·0% for persimmon and vine. Persimmon and vine were more susceptible to spray injury than the other species. The amount of P absorbed by the seedlings increased with the concentration of the solution. In these trials soil applications of superphosphate also favourably affected the growth of peach and vine but were ineffective on pear and persimmon, probably owing to planting injury.

2479. Bough, F. E.
Soil improving and conserving orchard cover crops.
Proc. Wash. St. hort. Ass. 1954, pp. 154-6, illus.

Recommended cover crops are chewings fescue, orchard grass, hairy vetch, alfalfa and ladino clover.

2480. Toenjes, W.
The response of Bartlett pear trees under sod mulch and clean culture systems of soil management.
Quart. Bull. Mich. agric. Exp. Stat., 1955, **37**: 363-74, bibl. 4.

The data presented in this report indicate that, under the conditions of this experiment, the sod mulch system of soil management is adapted for use in Bartlett pear orchards in Michigan. Alfalfa and, later, the grass sod cover, retarded growth and fruit production of the pear trees for the first 12 years after it was established. From then on, the trees made greater trunk circumference increase, produced heavier annual crops and larger fruit under sod mulch culture than did trees in the clean culture plots. At the end of the experiment, trees under the fertilized sod mulch system had produced a total of 1,136 bushels more fruit per acre than did the fertilized trees under clean culture. Likewise, they produced 80% more fruit above 2¼ in. in size during the 6 years that the fruit was size graded. Sod growth and mulch practically eliminated loss of water by runoff. Higher seasonal subsoil moisture in the sod mulch plot indicated that bluegrass sod cover conserved more water than was used for its own growth. The adverse effects of deficient summer rainfall were considerably less in the sod mulch plot than in the clean culture plot. The physical condition of the soil in the cultivated plot became progressively worse over the years. The gradual decrease in volume of cover crop growth return resulted in an insufficient amount of soil organic matter content, necessary for good soil porosity and tilth. Heavy cultural equipment led to poor soil structure and compacted the soil severely in the clean culture plot. This condition greatly retarded absorption and penetration of rain water. The resulting water runoff caused some soil erosion, and the loss of water brought about a droughty condition of the subsoil during summers of deficient rainfall. As a result, fruit size suffered considerably during such seasons. [From author's summary and conclusions.]

2481. Kurokami, T., Ashizawa, M., and Kuretani, M.
Studies on increasing soil productivity in sloping orchards. I. Effects on the physical and chemical properties of soils and on the growth of fruit trees of intermixing sedimentary soil from the bottom of a pond.
[Japanese, English summary ¾ p.]
J. hort. Ass. Japan, 1954, **23**: 137-51, bibl. 46, illus.

The properties of an orchard soil of granite rock origin and of sedimentary mud from the bottom of a pond were studied separately and in various mixtures. The growth of peaches, grapes and soya beans in these soils was also studied in a series of pot experiments. The addition of mud to the orchard soil slightly decreased its acidity and greatly increased its water-holding capacity. The vegetative growth of the test plants in orchard soil was increased by the addition of mud, the higher the proportion of mud the better being the growth. It is concluded that poor soils of granite rock origin can be reclaimed by the addition of fertile sedimentary mud.

2482. Bargioni, G.
L'andamento degli strati nei terreni alluvionali e la sua possibile influenza sulle culture arboree da frutto. **(The [irregular] deposition of alluvial strata and its possible effect on fruit tree growing.)**
Riv. Ortoflorofruttic. ital., 1955, **39**: 21-31, bibl. 16.

Studies were made on the effects of fine material deposited in Ferrara apple and peach orchards during the Po floods of 1951.

Training, pruning and other cultural operations.

(*See also* 3159 I.)

2483. Bazier, J.
Au jardin de l'arboriculteur. **(In the fruit-grower's garden.)**
Bull. hort. Liège, 1955, **10**: 136-7, illus.

A new method of training apples and possibly pears is described, in which the trees are trained to form a flat horizontal surface. Their support is formed by a band of 5 or 6 wires stretched about 70 cm. above the ground. The leading shoot is cut back to the level of the wires, and the 4 or 5 developing branches are later attached horizontally to the wires. Spacing of the trees depends on variety and rootstock.—École Hort., Grand-Manil, Gembloux.

2484. Riera, F. J.
Los emparrados frutales y el seto frutal. **(Fruit hedges.)**
An. Esc. Perit. agríc. Barcelona, 1953, **12**: 105-15, bibl. 1, illus.

Notes are given on apple and pear fruit hedge planting as seen in the Pyrénées Orientales in France. Six training methods are described, namely Morin, Delbar, Viña, Lepage unilateral slanting, Lepage bilateral vertical and Bouché Thomas. The apple and pear varieties chiefly used for fruit hedges in the district are named.

2485. Verner, L.
New methods of training Delicious.
Amer. Fruit Gr, 1955, **75** (5): 12, 41, illus.

Experiments at the University of Idaho have shown that wider crotch angles can be obtained in Delicious apple trees by retaining growth above the framework branches in young trees. The following 3 methods of training have proved successful. (1) *Delayed heading.* At planting time head back trees to 42 in. instead of the usual 36 in. When the new shoots are 4–6 in. long, head back again to 36 in. This will remove the upper cluster of narrow-angled branches after they have caused the lower branches to form wide crotch angles. (2) *Modified deshooting.* At planting time head back to 48 in. From the new shoots choose 5 scaffold branches, 5–9 in. apart, and shorten the remaining shoots 2 or 3 times during the growing season to within an inch or two of the trunk. (3) *Trunk renewal.* At planting time cut back to about 2 in. above the graft union. From the new shoots that develop, retain the best one coming from above the union and pinch off all the rest. On this new trunk, pinch off all shoots below the lowest framework branch and cut back the inter-scaffold shoots to about 1 in. but do not remove them. If the new trunk does not form branches during the first year, do not cut it back but leave the terminal shoot until all scaffold limbs have been formed. In all 3 systems 5 scaffold limbs should be retained, although the top one is only temporary and serves to keep the fourth branch growing at a wide angle. The temporary branch is pruned severely every winter and is removed when the branch below it is 3–4 years old. In order to keep the crotch angles wide, inter-scaffold growth should be retained but cut back severely every winter until the trees have borne 1 or 2 crops, when it may be removed. By retaining inter-scaffold growth the spread of the scaffold limbs has been increased by as much as 86%.

2486. Riera, F. J.
Poda libre (larga) y poda de expansión limitada (corta) en fruticultura. Resumen de veinte años de experiencias. (**Long and short pruning in fruit growing. Summary of 20 years' research.**)
An. Esc. Perit. agríc. Barcelona, 1953, **12**: 23-51, illus.

The author discusses the long and short pruning of apples and plums in the light of 20 years' research on 30 apple and 40 plum varieties at the Caldas de Montbuy Farm School. Tables give the responses of the different varieties to the 2 pruning methods with regard to growth, shoot production and, in the case of apples, the amount of leaves still carried on 1 November. Both pruning methods suit free-branching apples of low to intermediate vigour, and early plums of low to intermediate vigour with few laterals. Short pruning suits non-vigorous apples and early plums with few laterals, and also very vigorous, late plums with few laterals. Long pruning suits vigorous, free-branching apples and early to midseason vigorous plums.

2487. Christ, E. G.
Peaches are mower-pruned.
Amer. Fruit Gr, 1955, **75** (3): 30, 32-3, illus.

A description is given of a grower-built machine for cutting back the tops of peach trees which are then finished by hand. In a test with 8-year-old Golden Jubilee peaches it was found that if the tops were cut back by the machine the trees could be pruned in about half the time required for pruning entirely by hand. Yield and fruit produced by the 2 methods of pruning were identical. The existence of a similar machine built by another grower is mentioned.

2488. Schander, H.
Untersuchungen über das Unterschneiden von Kernobstsämlingen. (**Studies on root pruning of pome fruit seedlings.**)
Dtsch. Baumsch., 1955, **7**: 57-65, bibl. 2, illus.

To study the response of apple and pear seedlings to root pruning a tool was moved along the rows cutting the roots at a depth of 5 cm. below soil level when the plants had reached about the 5-leaf stage. The treatment induced root branching and was generally favourable to the development of the root system, but it depressed secondary growth in the first year. By the time the seedlings were ready for budding in the second season the treated plants had caught up with the controls. Photographic illustrations and graphs are provided on a generous scale.—Tech. Hochschule, Hanover.

2489. Hill, F. L., and Brazelton, R. W.
The steel squirrel.
Agric. Engng St. Joseph, Mich., 1955, **36**: 17-19, illus.

An illustrated description is given of a machine designed in California to speed up ladder operations of pruning, thinning and picking in fruit production, and to reduce overall costs of operation. The main frame of the machine is triangular with a free-castering wheel at the rear. A 6½ h.p. air-cooled engine propels the unit and also supplies power to the air compressor which operates the pneumatic lift cylinder, raising the operator's platform, "crow's nest", up to 10 or 12 ft. An air outlet in the crow's nest provides for attachment of pneumatic orchard tools. Greatly increased speed and improved working conditions resulting in better work are among the advantages claimed for the machine.

2490. van der Wijden, —.
Incisions spiralées sur écorce. (**Spiral incisions in the bark.**)
Groenten en Fruit, from abstr. in *Fruit belge*, 1955, **23**, Suppl. to No. 165, p. 8.

The removal of a spiral strip of bark is recommended as a more effective way of reducing excessive vigour in fruit trees than the removal of 2 half-circular strips. The spiral bark ringing should be done with an instrument consisting of 2 knives fixed together so that the blades are parallel and about 1 cm. apart. The ends of the spiral should overlap by about 3 cm. The beginning of May is the best time for treatment.

Composition of fruit.

(*See also* 2412g, 2474.)

2491. Ash, A. S. F., and Reynolds, T. M.
Water-soluble constituents of fruit. I. Some observations on the occurrence of free galacturonic acid in fruit.
Aust. J. biol. Sci., 1954, **7**: 435-43, bibl. 32.

Glucuronic acid showed no tendency to convert to the lactone when run on paper chromatograms in a variety of solvent mixtures. There were only slight differences between the R_F values of glucuronic and galacturonic acids in all the solvents used, including two mixtures for which large differences in R_F had been recorded. By the use of paper chromatography, a free uronic acid was detected in several varieties of pears after ripening at 20° C., but not in green or tree-ripened pears. Similar results were obtained with freestone peaches. No free uronic acid was detected in apricots whether ripened on the tree or at 20° C., or in apples whether green or after ripening at 20° C. Chemical tests applied to the free uronic acid in pears, after elution from paper chromatograms, indicated that it was galacturonic acid. In the sample which gave the strongest uronic acid spot, the concentration of free galacturonic acid was 350 µg./g. fresh fruit. [Authors' summary.]—C.S.I.R.O., Homebush, N.S.W.

2492. Džamić, M.
The dynamics and ratio of pectic substances, carbohydrates and organic acids in fruits. II. [Serbian, with German summary 1½ pp.]
Quantitative changes of pectic substances, carbohydrates and organic acids in fruits and their relation to one another. III. [Serbian, with English summary 2¼ pp.]
Rev. Res. Work Fac. Agric. Belgrade, 1954, **2** (1): 213-24, bibl. 16, and **2** (2): 111-32, bibl. 34.

In the first paper charts and tables are given showing the percentage of pectic substances, organic acids and carbohydrates and their respective ratios in 3 apple varieties as established at intervals during the 5-month period July to November.

In the second paper results are given of analyses of 9 apple varieties stored till April at 4° C., showing the percentages of pectin, carbohydrate and organic acid and the ratios carbohydrate/pectin, pectin/organic acid and carbohydrate/organic acid. [For Part I see *H.A.*, 23: 2626.]

2493. Crnčević, V.
Mehanički i hemiski sastav i tehnička upotrebljivost jabuka resanskog područja (NR Makedonija). (**Physical and chemical composition and technological utilization of apples in the Resan region (P.R. Macedonia).**) [English summary 1 p.]
Arh. poljopr. Nauk., 1954, **7** (17): 41-61, bibl. 13.

An analysis was made of some 20 Yugoslav and foreign apple varieties grown in the region. Weight of fruit, juice content and its physical characteristics, dry matter, sugar, acid, pectin, tannin and ash contents of the fruit, pH values and organoleptic properties of the juice are discussed and the different values found for domestic and foreign varieties compared. The results are tabulated in detail. Varieties suitable for juice production are recommended.

2494. Weurman, C., and Swain, T.
Changes in the enzymic browning of Bramley's Seedling apples during their development.
J. Sci. Food Agric., 1955, **6**: 186-92, bibl. 21.

A method for estimating enzymic browning of fruit tissue was developed and applied to an investigation of the changes in the intensity of browning of Bramley's Seedling apples during their development. It was found that the intensity of browning was largely determined by the activity of the enzyme system. It was concluded that naturally occurring enzyme inhibitors are also important factors in determining the extent of browning after injury. [From authors' summary.]—Low Temp. Res. Stat., Cambridge.

2495. Rankoff, G., and Popow, A.
Untersuchungen über die Früchte von *Pirus aucuparia* Gärtn. (**Investigations on the fruits of *P. aucuparia*.** [Russian summary 8 lines.]
C.R. Acad. bulg. Sci., 1954, **7** (1): 5-8, bibl. 7.

The fruits of *Pirus* (*Sorbus*) *aucuparia* are rich in sugars, acid, carotene and vitamin C. They can be used as a preserving agent and for carotene extraction.

Sorting and packing.

2496. Nyhlén, A.
Extra prima Cox's Orange—55 eller 60 mm.? (**Fancy-grade Cox's Orange, 55-60 mm.?**]
Fruktodlaren, 1955, No. 2, pp. 50-2.

In the 1954/55 cold storage trials on Cox's apples at Helsingborg, losses in the class of 55–60 mm. fruits were again very markedly lower than in the larger fancy grades (60–65 mm. and over) [see *H.A.*, 25: 1357]. Fruits from trees on A2 kept somewhat better than those of equal size from trees on M. IV. The premium for extra large Cox's Orange apples should be abolished.

2497. Parker, B. F., and Wiant, D. E.
Use of chromatic illumination and methods of product rotation for sorting red tart cherries.
Quart. Bull. Mich. agric. Exp. Stat., 1954, **36**: 435-47.
Efficiency of visual-manual cherry sorting.
Agric. Engng St. Joseph, Mich., 1955, **36**: 100-5, bibl. 11.

An analysis of the visibility of cherry defects revealed that the main visual differences in the cherries and their defects were due to lightness differences. Tests conducted in processing plants have shown that of 3 commercially available illuminants a 2910° K tungsten lamp (approximately 150 W. incandescent bulb) produced the greatest lightness contrast for dark effects. When lightness of cherry surface was used as the measure of efficiency a G.E. deluxe warm white fluorescent lamp was the most efficient in producing reflected luminous flux from the cherry surface. Covering the illuminant with a red filter was unsatisfactory, but the use of a purple filter was favourable. Tests, described in the first paper only, were also conducted with 2 rotating devices developed for turning the fruit along the sorting belt. A $\frac{7}{16}$ in. diameter rotating rod placed just above the belt appeared more efficient than thinner stationary rods.

2498. Gaston, H. P., and Levin, J. H.
Transporting red cherries in water from orchard to processing plant.
Quart. Bull. Mich. agric. Exp. Stat., 1955, **37**: 437-43, illus.
Handling cherries in water.
Amer. Fruit Gr, 1955, **75** (5): 11, 38, illus.

A method of transporting cherries directly from the orchard to the processing plant in tank trucks of water is described in detail. By this system all the fruit was in cold water within an hour of picking. The combination of orchard sorting, quick cooling and water handling proved to be an excellent means of maintaining quality. Water transportation reduced handling costs both by the grower and the processer. The need for lugs was eliminated. [See also *H.A.*, 24: 3534.]

2499. Guillou, R.
Cooling fruit in fibreboard.
Calif. Agric., 1955, **9** (2): 5-6, illus.

The effects of packing pears and plums in fibreboard boxes on their rate of cooling were studied. The fruit was first warmed to 85° F. before packing. Wrapped pears in the centre of a fibreboard box cooled at almost the same rate as those at the centre of a wooden box. Fibreboard boxes of plums required about half as long again to cool as did the standard 4-basket crate. Circulation of air through the fibreboard box appeared to be a promising method of hastening cooling; satisfactory circulation is obtained in standard refrigerator cars.

2500. Stallings, D. G., Crane, R. I., and Sammet, L. L.
Time study of plum packaging.
Calif. Agric., 1955, **9** (5): 2, 15, illus.

Labour requirements in packing plums were compared for 2 types of container: (1) The standard wooden container with inside dimensions 16 in. × 16 in., which holds 4 split-wood baskets each with 3 layers of plums separated by cardboard shims; the total net weight of fruit ranged from 26 to 33 lb. (2) An experimental corrugated paper carton, 13 in. × 13 in. × 6½ in. with 3 to 4 layers of fruit place-packed, covered by a cardboard tray and a top-facing layer of fruit; the net weight of fruit ranged from 24 to 26 lb. It took an average of 8·14 minutes to pack a standard crate and 7·63 minutes to pack a carton. Observations and limited tests suggest that labour requirements could be much reduced either by adopting the bulk [jumble pack] method instead of place-packing or by using the Brentwood lug with the so-called upside-down pack, in which only the top layer of fruit is place-packed.

2501. Sammet, L. L.
Packing box distribution costs.
Calif. Agric., 1955, **9** (4): 3, 15-16.

Costs are compared for 5 methods of distributing packing boxes in a deciduous fruit packing house with a capacity of 600 boxes per hour. Running costs of distribution ranged from $2·98 to $6·70 per hour.

2502. Hunter, D. L., and others.
Handling empty apple boxes in Pacific Northwest packing and storage houses.
Market. Res. Rep. U.S. Dep. Agric. **71,** 1954, pp. 36, illus.

Labour and equipment costs per 1,000 empty boxes were studied for performing 3 cycles of operations, using 3 chief types of equipment. The 3 cycles of operations were moving empty boxes from storage to road trucks or orchard trailers, moving empty boxes from storage to the packing line, and moving boxes from the dumping area to storage. The cost of the 3 operations was as follows: with manual handling plus a clamp-type 2-wheel hand truck, 11·63 dollars; with the hand truck alone, 6·15 dollars; with an industrial fork-lift truck and pallets, 8·22 dollars.

2503. Kriel, P. E.
The Board's bulk containers.
Decid. Fruit Gr, 1954, **4**: 247-50, 1955, **5**: 28-30, 49-53, illus.

An account is given of the bookkeeping system whereby records are kept of the whereabouts of the Union of South Africa Deciduous Fruit Board's stock of 800,000 standard and half lugs—whether in their own depot, with growers or at canning factories, markets, etc.—and the chemical treatment of the shooks before they are made up into boxes (12 hours' immersion in 5% copper sulphate solution and left to dry before nailing). Details are also given of the method and costs of storage of the boxes, 50% of which are stored in the open during the winter. Storage is in open stacks of 594 lugs made up of units of 3, one inside 2 facing one another. A stack is protected by a flat corrugated iron roof secured by wires running right round it, and rests on a creosoted wooden frame which raises it 3 in. from the ground.

2504. Richardson, B. D.
Labelling of fruit cases.
Tasm. J. Agric., 1955, **26**: 27-33, illus.

As a result of labelling trials, recommendations for effective application of labels are given.

Storage.

(*See also* 2346.)

2505. Padfield, C. A. S.
The storage of apples and pears.
Bull. N.Z. D.S.I.R. **111**, 1954, pp. 96, bibl. 60, illus.

The author has collated the results of N.Z. experiments on apple and pear storage. The information is set out in 3 sections, namely the influence of pre-storage conditions, conditions during storage, and physiological disorders and fungus diseases of stored fruits. The differentiation between different physiological disorders is very welcome.

2506. Melville, F.
The loss in weight of stored Jonathan apples.
J. Agric. W. Aust., 1955, **4**: 119-20.

Small-scale tests were made in 1954 to illustrate the effect of handling procedure before cool storage on weight and quality of Jonathan apples. Losses per 40–42 lb. wrapped fruit after 10 weeks' storage were 1¼–1½ lb. with immediate cool storage and 1½–2¼ lb. with 1 or 2 weeks' common storage before cool storage. The fruit cool-stored immediately was in good condition while the other 2 lots showed yellowing, shrivelling, Jonathan spot and breakdown.

2507. Stoll, K.
Einige Lagerungsversuche mit Tafelbirnen.
(Storage trials with dessert pears.)
Schweiz. Z. Obst- u. Weinb., 1955, **64**: 166-70, illus.

Among 3 medium-early dessert pear varieties tested in 3 seasons only Bartlett showed satisfactory quality after 2–3 months' storage at 0° C. One year's preliminary trials suggest that the storage life of Bartlett can be considerably extended by lining the boxes with polythene. Data are also tabulated on the keeping quality of 7 late varieties at 0° C. Of this lot only Conference kept satisfactorily until January and later.

2508. Schomer, H. A., Gerhardt, F., and Sainsbury, G. F.
Polyethylene box liners for pears and apples.
Proc. Wash. St. hort. Ass. 1954, pp. 193-8.

The storage life of Bartlett, Anjou, Comice, and Bosc pears is lengthened at least 8 weeks when the fruit is packed in 1·5 mils sealed polyethylene liners during long storage at approximately 30° F. The condition and appearance of the pears at time of removal from cold storage are much better than those in the standard pack. The pears from the film bags are still firm and turgid, green in colour, have less scald, and will possess longer shelf life than the regularly packed fruit. The full benefits of the film liner for pears will be gained only if there are no leaks in it. It is also important that the liner be opened or slit upon removal of the pears from cold storage. Failure to do so may result in development of off-odours and off-flavours. Golden Delicious apples benefit from film liners chiefly through reduction of moisture loss and shrivelling. Consequently the liners need not be sealed. Fruit of this variety stored in polyethylene liners has better appearance, condition, and dessert quality than fruit from standard packs. Polyethylene liners do not materially affect the heat transfer from the fruit during cold storage. [From authors' summary.]—Agric. Mktg Serv., U.S. Dep. Agric., Wenatchee, Wash. [See also *H.A.*, 24: 1227.]

2509. (Winter, J. D.)
Golden Delicious keeps well in film.
Amer. Fruit Gr, 1955, **75** (5): 22, illus.

A single year's test at the University of Minnesota has shown that Golden Delicious and Haralson apples will keep better in perforated polyethylene bags, in either a dry or damp cellar, than if they are not bagged. The apples, in 3 lb. lots, were enclosed in polyethylene bags each perforated with 36 holes about ¼ in. in diameter.

2510. Boyes, W. W.
Effect of polyethylene (polythene) wrappers on the keeping quality of apricots, peaches and plums.
Fmg S. Afr., 1955, **30**: 13-19, bibl. 4, illus.

Storage tests were made on Royal apricots, Early Dawn, Duke of York, Boland and Elberta peaches, and Santa Rosa, Gaviota and Kelsey plums, to determine whether polythene wrappers would affect keeping quality in cold storage. Though retarding fruit ripening, the polythene aggravated gel-breakdown in apricots, woolliness in peaches and internal breakdown in plums. These disorders were severe in polythene-wrapped fruit even at 50° F.

2511. Bömeke, H.
Verträglichkeit bzw. Unverträglichkeit der Holzschutzmittel mit dem Lagerobst. **(Compatibility and incompatibility of wood preservatives with stored fruit.)**
Mitt. ObstbVersuchsringes Jork, 1955, **10**: 106-9, illus.

Three years' trials showed that the most suitable, if not always the best, wood preservatives did not affect the storage quality of apples. The merits of many proprietary preparations are discussed.

2512. Hilkenbäumer, F., and Buchloh, G.
Zur Frage der Enstehung und Wirkung des Äthylens beim Reifen des Apfels. **(On the formation and action of ethylene in ripening apples.)**
Festschr. 25 jähr. Bestehen gärtn. Hochschulstud. Deutschland, 1954/55, pp. 41-6, bibl. 19.

(1) The climacteric rise in respiration is accompanied by a rise in ethylene production. (2) The steeper rise in respiration is caused by the activation of amylase in the fruit initiated by proteolytic enzymes. (3) The ethylene produced by unripe apples seems not to activate amylase until a specific acidity has been reached but to activate proteolytic enzymes which in their turn liberate amylase. (4) The addition of activated amylase and papain solution to suspensions from apples in the stage of the climacteric rise initiates the decomposition of starch and the increase in ethylene production at pH values at which the amylase in the fruit remains inactive. [Translation of authors' summary.]—Univ. Bonn.

2513. van Stuivenberg, J. H. M.
Rijping van peren na bewaring in het koelhuis. **(Ripening of pears after cold storage.)**
Fruitteelt, 1955, **45**: 359.

Some results are reported from experiments carried out by G. W. F. Maris McArthur on the enzyme activity in pears during storage. The varieties used were Beurré de Merode, Conference and Comtesse de Paris. There was little varietal difference in α-amylase activity during field growth, but during storage its activity increased at different rates. With Conference, a good after-ripening variety, amylase activity, taken as 100 in September/October, had only risen to 300–400 by June after cold storage. Comtesse de Paris, which is often difficult to after-ripen, had an enzyme activity of 1,100–1,500 by April. Intermediate values were found for Beurré de Merode. It was concluded that after-ripening was not possible once the enzyme activity had increased by 6–8 times that at picking. Comtesse de Paris fruits from the first picking showed increased enzyme activity sooner than that from later pickings.

2514. Edney, K. L., and Hamer, P. S.
Orchard practice and losses during storage.
Grower, 1955, **43**: 1127-9.

Kirdford Growers are co-operating with Ditton Laboratory in a study of *Gloeosporium* rot by keeping records of commercially-stored apples. The records showed that rot incidence was higher with late pickings. The importance of cracks and scab lesions in providing entry for the fungus was clearly demonstrated.

Marketing

(*See also* 2516m, q.)

2515. Merchant, C. H., Underwood, J., and McDonald, F.
Increasing Maine McIntosh apple sales in retail stores.
Bull. Me agric. Exp. Stat. **534**, 1954, pp. 15, illus.

In a market study in 1954 McIntosh apples were displayed in bulk (either Latin square or matched lot design), in carry-out cartons of 3½ lb. of apples and in polyethylene bags with a similar weight of fruit. The results were: (1) sales increased by 50% when one of the 2 kinds of consumer package was added to the bulk display and by 60% when both were added; (2) in the 3 stores displaying apples in bulk, bags and cartons throughout the study, the percentage sales from the 3 sources were 50, 30 and 20 respectively; (3) 75% of all sales were made on the last 3 days of the week; (4)

bruising rate during display averaged 1·55% for bulk, 0·25 for cartons and 0·18 for bags; (5) bruising rate between packing and arrival at retail stores was 15 apples per tray-pack compared with 27 and 28 respectively for equivalent amounts of fruit in cartons and bags.

Noted.

2516.

a EVREINOFF, V. A.
Les ancêtres de nos abricotiers. **(The ancestors of our apricots.)**
J. Agric. trop. Bot. appl., 1954, **1**: 431-40, bibl. 8.
See *H.A.*, 25: 1297.

b GAVRILOV, V. G., AND FEDOROV, B. I.
Effectiveness of peat-compost mixtures and phosphorobacterin in the seedling nursery. [Russian.]
Sad i Ogorod, 1955, No. 3, pp. 57-60, bibl. 1.
[For a similar account see *H.A.*, 25: 1302.]

c HAMEL, A.
Le prunier dans le Québec (Canada). **(The plum tree in Quebec.)**
Rev. d'Oka, 1955, **29**: 1-13, bibl. 14.
Including varieties.

d KEMP, W. S.
History of fruit growing in Central Otago.
N.Z. J. Agric., 1955, **90**: 169-85, bibl. 8, illus.
Pome and stone fruits.

e KNICKMANN, E.
Die Phosphatversorgung der Obstbäume. **(Phosphorus nutrition of fruit trees.)**
Phosphorsäure, 1954, **14**: 307-34, bibl. 67, illus.
A review.

f LIJSTEN, R.
Beurré Alexandre Lucas.
Fruitteelt, 1955, **45**: 455, illus.
A varietal description.

g LJONES, B.
Plommer i sortsamlingane ved Norges Landbrukshøgskole. **(Plums in the variety collection of the Norwegian Agricultural College.)**
Frukt og Baer, 1955, **8**: 44-57, bibl. 8.

h MEYLAN, J.-P.
Quelques aspects de l'arboriculture fruitière commerciale en Suède. **(Some aspects of commercial fruit growing in Sweden.)**
Rev. hort. suisse, 1955, **28**: 112-13.

i NISEN, A.
L'enracinement du pommier. Influence de quelques facteurs sur la vitesse et le mode de croissance des racines. **(The root system of the apple. The influence of certain factors on rate and mode of root growth.)**
Fruit belge, 1955, **23**: 4-9, 43-8, 62-4, bibl. 25.
A review.

j PFEFFER, R., AND FUNK, T.
Befruchtungsverhältnisse bei Köröser Weichsel. **(The pollination of Köröser Weichsel.)**
KOCH, H. J.
Die Sauerkirschensorte Köröser Weichsel. **(The acid cherry variety Köröser Weichsel.)**
Dtsch. Gartenb., 1955, **2**: 136-7, 137-40, bibl. 8, illus.
A Hungarian variety.

k POTTER, J. M. S.
Fruit from the garden.
Growmore Bull. Minist. Agric. Lond. **7**, reprinted with amendments 1954, pp. 15.
Fruit management in small gardens.

l REBOUR, H.
Pour lutter contre l'érosion menaçante plantons les arbres suivant les courbes de niveau. **(Contour planting to control soil erosion.)**
Arboric. fruit., 1955, No. 15, pp. 3-4, 7, 9, illus.
Methods of contour planting fruit and vines. [See also *H.A.*, 24: 3572k.]

m ROBIN, F.
Communications relatives à la dernière campagne agricole. III. La production et le marché des fruits et légumes en 1954. **(Reports on the 1954 agricultural season. III. Production and marketing of fruit and vegetables.)**
C.R. Acad. Agric. Fr., 1955, **41**: 182-7.
Figures for French production, imports and exports.

n ROLIN, P.
L'arboriculture fruitière belge dans le cadre Benelux. **(Fruit growing in Belgium within the framework of Benelux.)**
Fruit belge, 1955, **23**: 49-54.
Discusses the economy of the Belgian fruit industry in relation to imports from Holland.

o SAX, K.
Dwarf trees with bark inversion.
Amer. Fruit Gr, 1955, **75** (3): 38-9, illus.
For a similar account see *H.A.*, 25: 149.

p SCHMID, G.
Anbau- und Handelssortimente bei den Äpfeln. **(Apple varieties in Switzerland.)**
Schweiz. Z. Obst- u. Weinb., 1955, **64**: 86-90.
Belle de Boskoop, Bohnapfel, Glockenapfel and others.

q SHAFFER, J. D., AND QUACKENBUSH, G. G.
Consumer expenditure patterns for apples in 1952.
Quart. Bull. Mich. agric. Exp. Stat., 1954, **37**: 166-72.

r SHARPE, R. H., WEBB, T. E., AND LUNDY, H. W.
Peach variety tests.
Proc. Fla St. hort. Soc. for 1954, pp. 245-7, bibl. 7.

s SOUTY, J.
Les variétés de pêches. (**Peach varieties.**)
[*Publ.*] *Stat. Rech. vitic. arboric. fruit. Sud-Ouest*, undated, pp. 57-70, illus.

t STANKOVIĆ, D., AND BEĆAREVIĆ, A.
The movement and distribution of phosphorus in different organs of apple, pear, quince, apricot, peach and sweet cherry trees, determined by radioactive phosphorus as tracer. [Serbian, with English summary ¾ p.]
Rev. Res. Work Fac. agric. Belgrade, 1954, **2** (1): 164-75, bibl. 49.
A review of foreign and Yugoslav work.

SMALL FRUITS, VINES AND NUTS.

Small fruits.

(*See also* 2386, 2413, 2414, 2423, 2424, 2577d, f, g, p, w, 2992b, 3383, 3390, 3394, 3403.)

2517. HALL, J. W.
Scottish fruit trials. First Progress Report.
Scot. Agric., 1955, **34**: 222-4, bibl. 2.

Strawberry, raspberry and black currant variety trials were established at Auchincruive, Craibstone and Mylnefield during the dormant season in 1951-52 and at Liberton in 1952-53. In a first progress report the author discusses the records and observations made in 1953 and 1954.

2518. DARROW, G. M.
The new blueberry varieties.
Amer. Fruit Gr, 1955, **75** (4): 36, 38, illus.

Information and quality ratings are given for 5 new blueberry varieties suitable for the northern United States (Earliblue, Bluecrop, Berkeley, Herbert, Coville and Ivanhoe). Mention is also made of new canker-resistant varieties suitable for N. Carolina (Angola, Croatan, Wolcott and Murphy), of new rabbiteye types suitable for southern States (Callaway and Coastal), of varieties for limited use, and of some old varieties that should be discarded.

2519. HALL, I. V.
Floristic changes following the cutting and burning of a woodlot for blueberry production.
Canad. J. agric. Sci., 1955, **35**: 143-52, bibl. 7, illus.

This paper traces changes over a period of 4 years in the plant population after a woodlot in south-western New Brunswick was cleared of trees and burnt over annually for production of blueberries (*Vaccinium angustifolium* and *V. myrtilloides*). The expected increase in blueberry plants did not occur. Instead, the area was rapidly occupied by other plants. Clear-cutting and burning within the period of a year is too drastic a treatment for survival and development of repressed plants of *Vaccinium* usually present in woodland adjoining blueberry fields. Results of present local practice led to the recommendation that the woods should be opened gradually or cleared in narrow marginal swaths to allow invasion of vigorous blueberry rhizomes. [From author's abstract.]—Plant Path. Lab., Kentville, N.S.

2520. DOEHLERT, C. A.
Early pruning of blueberry whips.
[*Proc.*] *23rd annu. Blueberry Open House*, N.J. agric. Exp. Stat., 1955, pp. 10-11.

Long whips of Jersey, Dixi and Burlington were cut back by half in early autumn to stimulate fruit bud setting at the tip without inducing terminal growth. There was no change in Jersey and Dixi fruiting, and bush growth in height was restrained. With Burlington fruiting was impaired.

2521. DOEHLERT, C. A.
Can fall fertilizing help after October?
[*Proc.*] *23rd annu. Blueberry Open House*, N.J. agric. Exp. Stat., 1955, pp. 8-9.

A pilot experiment was started in 1953 to study the effect on blueberries of November applications of nitrogenous fertilizers. The results indicated that sulphate of ammonia applications gave greater yield of fruit and production of new shoots than applications of sodium or ammonium nitrate.

2522. HEGGLI, M.
Identifisering av solbaersorter. (**The identification of black currant varieties.**)
Frukt og Baer, 1955, **8**: 58-75, bibl. 2, illus.

Methods of identification are discussed, a key is provided and fully illustrated descriptions are given of 25 varieties.

2523. ANON.
Resultaten rassenproef met bessen. (**Results of a variety trial with currants.**)
Fruitteelt, 1955, **45**: 268.

In the Netherlands a trial of both jam and dessert varieties of red currants, started in 1947, has led to the following conclusions: 1. Duitse Zure was the heaviest cropper of the jam varieties, and Jonkheer van Tets of the dessert varieties; 2. The dessert varieties needed protection when young; 3. Jhr van Tets, Erstling aus Vierlanden and Duitse Zure benefited from open pruning; 4. Duitse Zure and Erstling aus Vierlanden were resistant to leaf-fall disease; 5. Dessert varieties grown as cordons gave early high yields, but production costs were increased.

2524. HUDSON, J. P., AND WILLIAMS, I. H.
Juvenility phenomena associated with crown gall.
Nature, 1955, **175**: 814, bibl. 3, illus.

When adventitious shoots grow from root cuttings of raspberries the earliest leaves are usually of pronounced juvenile form, successive leaves becoming progressively more adult in shape. In a few cases, in which this normal sequence was succeeded by a reversion to more juvenile forms, each shoot was found to have a well-developed basal gall caused by *Bacterium tumefaciens*. —Dep. Hort., Univ. Nottingham.

2525. Ervi, L. O., Hanioja, P., and Kivinen, E.
Mesimarjan (*Rubus arcticus* L.) marjontaa koskevia tutkimuksia. (**Studies on the fruiting of *Rubus arcticus*.**) [German summary 2 pp.]
Suom. Maatalousț, Seur. Julk., 1955, No. 83, pp. 93-112, bibl. 15.

The berries of the wild *Rubus arcticus* are valued in Finland for their flavour, but their yields have declined in recent years. Fruiting is abundant where the canes receive the ash of brushwood burnt in the vicinity. This observation and soil-analytical studies suggest that nutrient deficiency is the main cause of the decline, competition from other plants being another.

2526. Grolleau, J., and Vogel, R.
Observations sur le comportement de différentes variétés de fraisiers. (**Strawberry varietal trial.**)
Terre maroc., 1955, **29**: 89-95, illus.

Fifty-one strawberry varieties—Alpine, Everbearing, non-everbearing and unclassified—were tested in irrigated culture at Ain Taoudjat in Morocco in 1953. Notes are given on spacing, manuring, soil management, dates of flowering and maturity, yields and prices. The ten highest yielders were all from recently introduced stock. The everbearing Géant Simmen was the highest yielder (150 g. per plant; coming into bearing in mid-May), followed by Madame Moutot and Inga. Royal Sovereign came 9th with 99 g. per plant.

2527. Pastoriza, R.
Aptitud de dos variedades de frutillas para la congelación rapida. (**Suitability of 2 strawberry varieties for quick freezing.**)
Rev. Invest. agríc. B. Aires, 1952, **6**: 425-36, bibl. 10.

Both Corondina and Dr. Morere were found to be suitable for quick freezing. Their ascorbic acid contents are given.

2528. Anon.
Red stele resistance in strawberries.
Amer. Fruit Gr, 1955, **75** (4): 43.

The U.S. Department of Agriculture have found that some strawberry varieties previously classified as resistant to red stele may be susceptible to new races of the fungus. Temple, Sparkle and Fairland have become infected. The new variety Stelemaster is at present considered to be resistant to multiple strains of the fungus.

2529. Arney, S. E.
Studies of growth and development in the genus *Fragaria*. IV.* Winter growth.
Ann. Bot. Lond., 1955, **19**: 265-76, bibl. 9.

The initiation and growth of leaf primordia has been followed during four winters, and similar rates were obtained in each season. When allowance is made for temperature differences, these rates are at a much lower level than during the active growing season. In this respect winter dormancy involves a physiological change resulting in a lower level of activity rather than a complete cessation of activity. Leaf emergence and expansion, on the other hand, are completely stopped during the winter; this appears to be the result of photoperiodic induction by the shortening days of August and September and is not primarily dependent on the fall in temperature. [Author's abstract.]—Univ. Coll., Cardiff.

2530. Arney, S. E.
Studies of growth and development in the genus *Fragaria*. V.* Spring growth.
Ann. Bot. Lond., 1955, **19**: 277-87, bibl. 2.

From observations of leaf emergence dates and periodical dissections of stem apices it appears that leaf initiation does not keep pace with leaf emergence during the spring. This leads to a subnormal number of enclosed leaf initials at each stem apex at some time in April or May. Forced plants behave similarly, and it is concluded from these results and from direct experiments that part of the lag of leaf initiation on leaf emergence is connected in some way with the flowering of the first inflorescence to emerge from the crown. Conditions in the bud at the end of the winter also lead to an excess of leaf emergence over leaf initiation in the early spring. [Author's abstract.]—Univ. Coll., Cardiff.

2531. Smeets, L., and Kronenberg, H. G.
Runner formation on strawberry plants in autumn and winter. [Dutch summary.]
Euphytica, 1955, **4**: 53-7, bibl. 3, illus.

Strawberry plants of the Deutsch Evern variety were brought into a glasshouse in autumn and placed under controlled light and temperature conditions. Runners were only produced under long-day conditions at 23° C. and were most prolific from plants housed and illuminated from early September. Plants under short-day conditions (at 17° C.) did not form runners but flowered continuously throughout the winter.—Inst. hort. Pl. Breeding, Wageningen.

2532. Bruchem, Centraal Bemestingsproefveld voor de Aardbeienteelt (Borgman, H. H.).
Samenvatting van de resultaten, verkregen in de jaren 1949 tot en met 1952. (**Summary of results obtained in 1949-1952 inclusive at the Central Experimental Field for Strawberry Manuring**), undated, pp. 20, illus.

Several manurial experiments were carried out with strawberries (var. Deutsch Evern), lettuce, cauliflower and sprouts on a soil high in phosphates. In frames strawberries made luxuriant vegetative growth when more than 180 kg./ha. N was applied, but yields were reduced by fruit rotting. High N applications produced later, and high K applications earlier, cropping. Highest yields were obtained in soils with a K content of 0·020%. In the open continued applications of acid fertilizers to strawberries reduced yields. Fertilizer applications in spring resulted in root scorching and lower yields than autumn fertilizing. Chloride-containing K fertilizers applied in a dry spring caused leaf scorch. Lettuce reacted favourably to acid fertilizers; high N applications gave the highest yields. Best yields of cauliflower and sprouts were obtained from alkaline fertilizers; N omission depressed yields in both crops.

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* For Parts I, II and III see *H.A.*, 23: 2694 and 24: 212 and 3547.

2533. Nitsch, J. P.
Free auxins and free tryptophane in the strawberry.
Plant Physiol., 1955, **30**: 33-9, bibl. 30.

A more detailed quantitative evaluation of free auxins in strawberry achenes confirmed the existence of a very steep and narrow peak in auxin concentration around the 12th day after pollination. The level of free tryptophane in both achenes and receptacles has also been followed during the development of the fruit. Tryptophane concentration is higher in the receptacle than in the achenes. A peak in the level of free tryptophane in the receptacle occurs concomitantly with the maximum in free auxin concentration in the achenes. Chromatographic treatment of acid and neutral fractions, as well as of total extracts of both achenes and receptacles, separated up to 7 different growth substances in the achene extracts. The most prominent of these substances has been indirectly identified with indole-3-acetic acid, while the exact chemical nature of the others is not yet established. No appreciable quantities of either auxins or inhibitors were detected in the ether extracts of receptacular tissues. In the course of this work some technical improvements have been devised, especially in the purification of the plant extracts and in the bioassay. [Author's summary.]—Harvard Univ., Mass.

2534. Voth, V.
Stored strawberry plants.
Calif. Agric., 1955, **9** (2): 9, 16, illus.

In southern California, strawberry plants of the Lassen variety were dug in February and stored at 28°–30° F. until August, when they were planted out. In the following spring the yield from stored plants was almost the same as that from plants planted the previous April. The quality of the early spring fruit from April plantings was not so good as that from August plantings; this was thought to be due to insufficient chilling during the mild frost-free winter.

Vines.

(*See also* 2346, 2413, 2414, 2423, 2478, 2481, 2577a-c, e, h, m-o, q-v, x-z, 3390, 3404.)

2535. Coombe, B. G., and Jennings, J. P.
Changing vine varieties.
J. Agric. S. Aust., 1955, **58**: 288-96, illus.

Subjects discussed are the relative merits of reworking and replanting, compatibility and grafting methods. Tables give the acreages in South Australia in 1941 and 1952 under different varieties of black and white wine grapes and drying varieties, and the compatibility of 13 varieties as rootstocks with 18 as scions.

2536. Yee, W.
The Isabella grape.
Agric. Ext. Circ. Hawaii agric. Ext. Serv. **350**, 1955, pp. 8, bibl. 15, illus.

In 1929 after considerable study the Experiment Station decided that the Isabella (*Vitis labruscana*) was the only vine variety suitable for Hawaii. Advice is given to home growers on propagation by cuttings, planting, fertilizing, trellising, training and pruning, and the control of pests and diseases.

2537. Cosmo, I.
Uve da tavola. Produzione—conservazione—appassimento. **(Dessert grapes: production, storage and drying.)**
Atti Accad. ital. Vite, 1954, **5**: 76-96, illus.

Sardinian and Italian production of dessert grapes for consumption fresh or as raisins, varieties for Sardinia, storage on the vine or in cork fragments, sawdust or other material.

2538. Dessy Deliperi, E.
Uve da appassire. **(Grapes for drying.)**
Atti Accad. ital. Vite, 1954, **5**: 105-16.

A proposal is made for the introduction into Sardinia of seedless grape growing with a view to exporting the dried product. Five Pirovano seedless hybrids are recommended; their fruits are larger and have a better flavour than Sultanina. Notes are given on drying by the Turkish and Greek methods.

2539. Tkačenko, G. V.
Cleistogamy and its effect on the development of grapes. [Russian.]
Sad i Ogorod, 1955, No. 1, pp. 67-8.

In Transcarpathia in 1952 many vine flowers were found to be cleistogamous. A very high percentage of these flowers dropped, and even when set the berries remained undersized. It is recommended that in years when the incidence of cleistogamy is high vines should be artificially cross-pollinated. Varieties particularly prone to cleistogamy are listed.

2540. Zimmermann, J.
Entwicklung, Histologie und Wasserhaushalt des Blattes in Beziehung zur Ökologie der Rebe (Gattung Vitis). **(Development, histology and water balance of the leaf in relation to the ecology of *Vitis*.)** [English, French, Spanish summaries 8 lines each.]
Mitt. Klosterneuburg, Ser. A, 1955, **5**: 70-90, bibl. 20, illus.

Morphology, histology and rate of development of the leaf were studied in several *Vitis* spp., with special reference to the water balance. The extremes in the genus are represented by *V. rupestris* and *V. cinerea* which respectively develop their thick, succulent leaves rapidly and their thin, hirsute leaves slowly, *V. vinifera* being intermediate. In pot trials species with succulent leaves were found to counter water deficiency with an increase in suction pressure and to be less drought-resistant than species with thin leaves and a low water content which respond with a reduction in transpiration. In grafted *V. vinifera* vines, where the response of rootstock and scion was unco-ordinated, wilting occurred sooner than in *V. vinifera* vines on their own roots. The relationship of physiological type to root formation in cuttings and to graft-compatibility is discussed. In the breeding of varieties and rootstocks the aim should be to combine high suction pressure with adaptable transpiration and thus to produce drought-resistant vines which are easily grafted.

2541. AVRAMOV, L.
Osipanja cvetova kod važnijih autohtonih i nekih stranih sorata vinove loze u NR Srbiji. **(Flower drop in the more important indigenous and some foreign vine varieties in Serbia.)** [German summary 2½ pp.]
Arh. poljopr. Nauk., 1954, **7** (15): 67-84, bibl. 16, illus.

Studies were made on flower drop in 21 vine varieties with hermaphrodite flowers and in 9 varieties with functional female flowers in 6 localities during the period 1951-1953. The phenomenon appeared to be more prevalent on the varieties with female flowers, and the percentage of small [shot] berries in the bunch was also larger in varieties of this type. Flower drop is due primarily to degeneration of the organs of the ovule and its causes include varietal characteristics, nutrition, vegetative vigour and ecological conditions, in particular weather. The role of insect pollinators did not appear to be of great importance in these studies, but it is suggested that incidence of peronospora (*Plasmopara viticola*) may affect fruit set.

2542. GÄRTEL, W.
Beerengrösse, Kernzahl und Mostgewicht beim Riesling. **(Size of berry, number of seeds and sugar content of juice in the Riesling vines.)**
Weinberg u. Keller, 1954, **1**: 51-8, bibl. 15.

Measurements carried out on Riesling vines showed that size and weight of the berry are determined by the number of seeds formed. The weight of the berry was proportional to the cube of its diameter. The sugar content of the juice decreased in a linear relationship with an increase in the number of seeds. Rain may cause a considerable reduction in the sugar content of the juice resulting from an osmotic exchange with the rain water that penetrates through fine cracks in the skin [Stalder, *H.A.*, 24: 1356]. The hormone theory is adduced to explain the relationship between seed number and berry size.—Biol. Bundesanst., Bernkastel-Kues/Mosel.

2543. ZIROJEVIĆ, D.
Sraščivanje loznih kalemova u strugotini, mahovini i pesku. **(The union of vine grafts in sawdust, moss and sand.)** [French summary 1½ pp.]
Arh. poljopr. Nauk., 1954, **7** (17): 77-84, bibl. 8.

A study was made at Niš on the graft union of the variety Prokupac on B. × R. Teleki 8B and B. × R. Kober 5BB stratified in sawdust, sand and moss. The highest percentage of good unions with both rootstocks was obtained when the grafts were stratified in sawdust, the lowest when stratified in moss.

2544. BIRK, H., AND SCHENK, W.
Abhärtung von Kartonagereben. **(The hardening of bench-grafted vines.)**
Ber. Lehr- u. ForschAnst. Geisenheim/Rhein, 1953/54, pp. 50-1.

Bench-grafted vines were found to require some shade during hardening as a protection against intensive ultra-violet radiation.

2545. HERING, M.
Die Holzreife der Unterlagsreben im Moselgebiet 1954. **(The maturity of the wood in vine rootstocks of the Moselle area in 1954.)**
Weinberg u. Keller, 1954, **1**: 241-7.

Many varieties of rootstocks were obtained from vine nurseries in the Moselle area and cross-sections were made to determine the maturity of the wood. Data are tabulated on the wood: pith ratio, the concentration of starch granules and the water content of the wood in % fresh weight. Agreement on uniform standards of wood maturity is desirable.—Biol. Bundesanst. Bernkastel-Kues/Mosel.

2546. BRIZA, K., AND MILOSAVLJEVIĆ, M.
Determining the fruitfulness of vine buds during dormancy. [Serbian, with German summary 1½ pp.]
Rev. Res. Work Fac. Agric. Belgrade, 1954, **2** (2): 214-27, bibl. 6, illus.

A detailed description is given of a simple method of forcing large quantities of vine buds to produce well-developed inflorescences visible to the naked eye. Of 3 growing media used for forcing under glasshouse conditions, water at 21–24° C. was found the best, giving results in 23 days. When forcing is started between 21 February and 10 March reliable estimates of the number of inflorescences per bud can be made in time to determine what pruning is necessary.

2547. FARRAG, E. E.
Thinning of grapes with naphthalene acetic acid.
Trop. Agriculture Trin., 1955, **32**: 147-9, bibl. 3.

Spraying Faumy vines with 0·05% NAA at full bloom effectively thinned the flowers. The number of grapes per bunch was reduced by 15%, the average weight per grape was increased by 15% and the average weight per bunch remained the same.—Coll. Agric., Univ. Cairo.

2548. LEVY, J. F.
La vulgarisation du diagnostic foliaire en viticulture et ses premiers résultats. **(Extended use of leaf analysis in viticulture and its first results.)**
Plant Analysis and Fertilizer Problems, [1955], pp. 151-5, I.R.H.O. Paris, being part of *Proc. 8th int. bot. Congr. 1954.*

Leaf analysis has been used in extensive tests in the control of vine nutritional deficiencies. The Maume method was used and results were compared with his experimental optimum. Results of 136 analyses carried out in 1951-53 showed that in general the prescribed fertilizer programme considerably improved N nutrition during the 3 years. Average P_2O_5 contents showed an exceptional increase in 1952, a favourable year for P uptake, with a reduction in 1953, though the level was still above that of 1951. Almost all P deficiencies disappeared. There was a slow improvement in K nutrition, which was the most seriously deficient element.—Lab. Coop. Diag. fol. et Biochim. agric. Montpellier.

2549. Lafon, J., and Couillaud, P.
Nouveaux essais de fumure foliaire sur la vigne effectués en 1954. **(New experiments in vine foliar nutrition made in 1954.)**
C.R. Acad. Agric. Fr., 1955, **41**: 96-103, reprinted in *Progr. agric. vitic.*, 1955, **143**: 317-23.

Laboratory and greenhouse tests showed that: (1) sodium salts, even at weak concentrations, can cause leaf burn; (2) most other salts can be used at 500 g. and 1 kg. per hl.; (3) young leaves absorb better than old; (4) the upper and lower surfaces of leaves absorb equally well; (5) fertilizers are only absorbed in solution and the moister the air the better they are absorbed. In a field test K, NK, NPK and N gave yield increases of 11·6, 28, 20·8 and 8·3% respectively compared with the control (1·2 kg. fruit per vine). In a second test potassium sulphate in 1953 followed by potassium nitrate in 1954 gave an 83% yield increase. In a third NK gave a yield increase of 16·6%, while in a fourth NK is quoted as giving a yield of 2·84 kg. compared with 1·25 kg. in the control. It is considered that (1) treatment should begin soon after spring flush; (2) hygroscopic salts such as potassium nitrate should be used; (3) at least 10 hl. liquid per ha. should be used; (4) at least 5 applications are necessary.

2550. Hibon, J.
Fumure expérimentale de la vigne. Rapport d'expérimentation pour 1954. **(Vine fertilizer experiments: results for 1954.)**
Fruits et Prim., 1954, **24**: 532-5.

In fertilizer experiments made near Casablanca in 1954 on fine-textured, lime-free, clay-silica soil which had received phosphate and lime [and other fertilizers?] in 1951/53, a number of NK treatments were given, using N as organic, nitric and ammoniacal N and K as chloride and nitrate. The best formulation, which represented a N/K_2O ratio of 1/1·68 and included nitric and ammoniacal N and K as nitrate, gave a yield of 120 quintals per ha. compared with 72 in the controls. Taking into consideration costs and the previous lime and phosphate applications, the NK fertilizer formulation recommended for current use is 300 kg. ammonium nitrate (20% N) and 250 kg. potassium chloride (60% K_2O) per ha., which represents an N/K_2O ratio of 1/2·5.

2551. Liwerant, J.
Fumure de la vigne. **(Manuring vines.)**
Ann. agron., 1954, **5**: 880-1.

In a long-term manurial experiment NPK and PK were found to reduce the range of variation in grape yields and sugar content from year to year, as compared with controls and N-treated plots, both of which reflected climatic conditions more strongly. NPK produced highest grape and sugar yields in good and bad seasons, but the effect of the fertilizer was more pronounced in bad years. P had a favourable influence on fruit yields and K on sugar content.—Toulouse.

2552. Depardon, L., and Buron, P.
Fumure potassique de la vigne. **(Potassium manuring of vine.)**
Ann. agron., 1954, **5**: 832-4.

An application of 100 kg. K_2O/hectare gave higher yields of grapes than no K_2O or 150 kg. K_2O, the potassium content of the leaf being 0·87% and 1·37% of the dry matter for the last two treatments respectively. Potassium manuring also caused a significant increase in the sugar content of the must.—Blois.

2553. Larsen, R. P., Kenworthy, A. L., and Bell, H. K.
Shortages of potash limit Michigan grape yields.
Bett. Crops, 1955, **39** (2): 13-16, 47-8, bibl. 2, illus.

A survey of Michigan grape-producing areas indicated that 65% of the Concord vineyards were suffering from K deficiency. Symptoms observed were marginal and interveinal chlorosis which by harvest time had often progressed to leaf crinkling and necrosis. There was a direct relationship between grape yield and K content of the petioles; in healthy vines producing over 4 tons of grapes per acre the K content averaged 1·99% on a dry weight basis. K deficiency symptoms were generally apparent where there was less than 0·75% K in the petioles. Drought may also be a contributory factor to the occurrence of K deficiency symptoms. In 1954 a potash fertilizer trial was started, using muriate and sulphate of potash at 2 rates, representing 180 and 90 lb. potash per acre, which were applied to 6 vineyards of varying K status. Plots receiving high K_2O from either source showed no K deficiency symptoms, grew vigorously and produced large well-formed bunches of grapes. Low potash plots showed moderate deficiency symptoms, and vigour and bunch size were better than in the controls. At harvest significantly higher fruit yields were taken from high K_2O plots than from low K_2O plots or controls.

2554. Antcliff, A. J.
A note on the nutrition of the Sultana bunch.
J. Aust. Inst. agric. Sci., 1955, **21**: 39-40, bibl. 2.

Investigations on the Sultana (Thompson Seedless) vine at the Commonwealth Research Station, Merbein, suggest that the foodstuffs in the vine form a "pool" from which all bunches and shoots can draw, and that any operation which decreased the capacity of the vine for producing foodstuffs, e.g. topping or late disbudding, would be detrimental, in that it would decrease the amount in the "pool".

2555. Rivoire, R., and Orizet, L.
Les rapports des sols et des cépages dans les vignobles Beaujolais et Mâconnais. **(Relationships between soils and vine varieties in the Beaujolais and Macon vineyards.)**
Bull. Ass. franç. Ét. Sol., 1954, No. 50, pp. 1-13, from abstract in *Soils and Ferts*, 1955, **18**, No. 960.

Characteristics of the soils are described. The influence of the type and geological origin of the soil on the success of different vine stocks and on the quality of the wines is discussed at length. The effects of other factors, including climate, microclimate, soil microflora and cultural practices are briefly considered.

2556. Depardon, L., and Buron, P.
Causes du mauvais développement des cultures faites sur des sols longtemps plantés en vigne. **(Causes of poor development of crops grown on old vine soils.)**
Ann. agron., 1954, **5**: 729-30.

Old vine soils were found to be depleted of both nitrogen and organic matter, and to be acid if the original reaction had been neutral. The copper content of the soil had little injurious effect on the growth of subsequent crops.—Blois.

2557. Weise, R.
Wetterkundliches bei Rebenerziehungsversuchen. (**Meteorological considerations in the training of vines.**)
Weinberg u. Keller, 1954, **1**: 85-90.

Microclimatic observations in Franconia suggest the desirability there of training vine stems to a height of 75–120 cm.—Agrarmeteor. Versuchsstelle Würzburg-Stein.

2558. Kasza, D. S.
Research work on maturation of grapes.
N.Z. J. Agric., 1955, **90**: 159-60, illus.

Weekly analyses of sugar and total acid contents of 1 lb. random samples of Riesling Sylvaner and Pinot Meunier are given for 1952-54. Maturity of Riesling in 1954 was faster and more perfect than in the 2 previous years. Advice is given to growers on how to assess maturity in the field by using a refractometer.

2559. Benvegnin, L., and Capt, E.
L'échantillonnage à la vigne pour l'évaluation de la maturité du raisin sur cep. (**Vine sampling to estimate grape maturity on the plant.**)
Rev. romande Agric. Vitic., 1955, **11**: 13-14.

Preliminary results showed that the most reliable estimate of grape maturity was given by the collection of one grape per plant, taken from alternate aspects. In a further test the degree of maturity estimated by this method corresponded very closely to the final analysis of the must from the total yield.—Stat. féd. agric. Lausanne.

2560. Marteau, G.
Évolution de la teneur en glucides solubles dans divers organes de la vigne au cours de la maturation des raisins. (**Changes in the content of soluble carbohydrates in different organs of the vine during grape maturation.**)
C.R. Acad. Agric. Fr., 1955, **41**: 193-8, bibl. 4.

The experiments, the results of which are described here, show the important role of sucrose in soluble carbohydrate reserves. During grape maturation the rate of sugar translocation to the grape depends directly on the soluble carbohydrate reserves accumulated in the leaf, whereas in spring the grape is supplied from reserves accumulated mainly in the trunk.

2561. Martin, L. R.
One man can harvest 100 tons a day
Amer. Fruit Gr, 1955, **75** (5): 13, illus.

Work at the University of California on the mechanical harvesting of raisin and wine grapes has shown that the method requires a special system of trellising designed to allow the clusters to hang free. With the new trellis system 90% of the crop has been recovered by a tractor-mounted cutter-bar. The machine, operated by 1 man, will harvest 100 tons of wine grapes a day, compared with 1½ tons harvested by 1 man by hand. Some hand work will probably always be necessary to get the clusters to hang free of the trellis, but this can be done during the slack summer season. For really successful wine grape harvesting, new long-stemmed varieties may have to be developed. Mechanical harvesting is not considered suitable for table grapes. Further improvements in the machine and the trellising system are planned.

2562. Sammet, L. L., and French, B. C.
Costs of packing fresh grapes.
Calif. Agric., 1955, **9** (2): 2, 14.

Costs of packing Californian table grapes for interstate shipments were analysed using data from 21 packing firms. There were substantial variations between firms in the total cost per standard display lug, but with Emperor grapes the total costs averaged 65 c., with Tokay 66 c., and with summer grapes 75 c. Packaging materials formed 56% of the total cost, and labour 31%. The largest single labour item was the direct packing labour, and the cost of this was the source of greatest variation between firms. The authors conclude that cost reductions could be achieved in many packing houses, generally by numerous small improvements in individual operations and by improved organization.

2563. Bennett, A. J.
Dried vine fruits. Marketing developments since the war.
Quart. Rev. agric. Econ., 1955, **8**: 25-30.

The chief export markets for dried vine fruits produced in Australia are the U.K., Canada and New Zealand, competitors being Greece, Turkey and the U.S.A. The increased capacity of these export markets, all of which afford preferential tariff treatment, appears to offer the Australian industry reasonable prospects of expansion, provided high standards of quality and efficiency are maintained.

Nuts.

(*See also* 2577i-l, 3408 l.)

2564. Gerardi, L.
Grafting methods adapted to nut trees.
45th A.R. north. Nut Grs' Ass. 1954, Lancester, Pa, pp. 41-4.

Four methods, viz. T bud, plate bud, simple bark graft and splice graft are described, as used in walnut and other nut tree propagation.

2565. Burgart, H. P.
Rock phosphate for nut trees.
44th A.R. north. Nut Grs' Ass. 1953, Rochester, N.Y., pp. 135-6.

A brief note on applying ground rock phosphate in the spring to encourage the start of new feeder roots and so prevent winter injury.

2566. Sonneman, W. F.
Harvesting the nut crop.
45th A.R. north. Nut Grs' Ass. 1954, Lancaster, Pa, pp. 54-6.

Methods of gathering, cleaning, drying and storing black walnuts, hickories, pecans, filberts and wild hazel nuts are outlined. Walnuts and hickories for seed should be cleaned, slightly dried and stratified at once.

2567. McKay, J. W., and Crane, H. L.
Blossoming characteristics of horticultural varieties and seedling progenies of Chinese chestnuts.
45th A.R. north. Nut Grs' Ass. 1954, Lancaster, Pa, pp. 93-8.

A popular article discussing variability in the seedling progeny of Chinese chestnut [*Castanea mollissima*] and showing that a much higher percentage of grafted trees than seedlings blossom and produce a crop.

2568. McDaniel, J. C.
Hicans in Illinois.
45th A.R. north. Nut Grs' Ass. 1954, Lancaster, Pa, pp. 68-77.

"A hican is any clone of edible nut tree resulting from hybridization of pecan with another hickory species or hybrid, in which the nut carries a blend of pecan and hickory nut characteristics."

2569. Caldwell, D. H.
Natural variation observed in shagbark hickory, *Carya ovata* (Mill.) K. Koch. in Central New York.
44th A.R. north. Nut Grs' Ass. 1953, Rochester, N.Y., pp. 29-39, illus.

Of 5 organs of the hickory examined, the nut exhibited the greatest variability. Striking dissimilarities were noted in its size, shape, shell colour, thickness of shell and palatability of nutmeat.

2570. O'Rourke, F. L.
Propagation of the hickories.
44th A.R. north. Nut Grs' Ass. 1953, Rochester, N.Y., pp. 122-7, bibl. 25.

Various methods are reviewed, of which patch budding is the most widely used. Storage of budwood, grafting waxes and rootstocks are also discussed.

2571. Spina, P.
La coltura del pecan. Descrizione delle cultivar siciliane e ricerche sulla loro biologia fiorale. **(Pecan culture. Description of Sicilian varieties and research on their floral biology.)** [English summary 7 lines.]
Riv. Ortoflorofruttic. ital., 1955, **39**: 148-71, bibl. 53, illus.

The varieties investigated were Delmas, Frotscher and Mantura, all of which are self-sterile. Notes are given on pollen germination, cross pollination, the characters of the 3 varieties and cultural practices in Sicily.

2572. Barlow, A. L.
Thomas walnut seed treatment with radioactive cobalt.
45th A.R. north. Nut Grs' Ass. 1954, Lancaster, Pa, pp. 56-9.

Lots of 50 walnuts were treated in Michigan with radioactive cobalt for 30 min. at from 1,000 to 50,000 rep.* and then stratified. The higher rates of treatment appeared to stimulate germination. About 5 months after stratification 12 out of the 50 nuts which received radiation of 30,000 rep. grew, while of the untreated controls only 5 grew.

* =Roentgen Equivalent physical.

2573. Shelton, E. M.
Patch budding black walnuts.
45th A.R. north. Nut Grs' Ass. 1954, Lancaster, Pa, pp. 37-41, illus.

The method described, also called flap patch, differs from the ordinary patch budding in that only a very narrow strip ($\frac{1}{8}$ in.) of bark is removed from the rootstock leaving 2 flaps, and when the bud patch is inserted the flaps are pressed down over the edges of the patch and tied lightly with a rubber band. Best results were obtained with scions cut in March, stored in polyethylene bags in the refrigerator at 35-40° F. and budded on seedling rootstocks about 1 June.

2574. Rudić, M.
Jedan novi način kalemljenja oraha—Kalemljenje na zeleno običnim spajanjem (zeleno na zeleno). **(A new method of walnut grafting. Herbaceous grafting by a simple splice.)** [French summary 1 p.]
Arh. poljopr. Nauk., 1954, **7** (15): 38-49, illus.

Results of 2 years' trials have shown that herbaceous grafting of walnuts by the simple splice method gives 90% take. The rootstocks can be 1-, 2- or 3-year-old seedlings (*Juglans regia*) of not less than 8 mm. diameter at the point of union. Scions of corresponding thickness are used and all the leaves of both graft components and the laterals of the rootstocks are removed. The most suitable time for this method of grafting is during the period of intensive shoot growth at the start of lignification. An average daytime temperature of between 18 and 30° C. is most favourable. The problem of wood maturity before dormancy is considered.

2575. Stoke, H. F.
Blossoming habits of the Persian walnut.
44th A.R. north. Nut Grs' Ass. 1953, Rochester, N.Y., pp. 18-22.

There are some walnut varieties in which the staminate and pistillate flowers open simultaneously and are therefore self-fertile. In others the female flowers open before the male flowers are mature or after they have already shed their pollen, and therefore have to be pollinated by different varieties. To assist in the selection of pollinators tables are given showing which varieties shed their pollen at the time others are receptive.

2576. Lopušanskiĭ, P. I., and Molotkovskiĭ, G. H.
The intensity of respiration in metameric portions of walnut and the occurrence of polarity. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1955, **100**: 1179-82, bibl. 9.

Respiration was measured, on 3 different dates, in portions of shoot, leaflet, husk and fruit stem of walnut (*Juglans regia*). Respiration rates were higher in the apical regions of internodes, terminal leaflets and the other organs than in the lower parts. The intensity of respiration in the apex of the 10th internode of shoots on 20 July was found to be 5 times greater than that in the base of the 1st internode.

Noted.

2577.

a ALBERTARIO, P.
La produzione delle uve da tavola. (**Dessert grape production [in Italy].**)
Ital. agric., 1955, **92**: 99-127, illus.
Varieties, acreage and production, economics and marketing.

b BASTELEUS, R., AND OTHERS.
La culture de la vigne dans les serres Brabançonnes. (**Vine growing under glass in Belgium.**)
Le Sillon Belge, 99 rue General Henry Etterbeek, 2nd edition 1948, pp. 80, illus.
A useful bulletin only recently received, price not stated.

c BECKER, H., AND BRÜCKBAUER, H.
Die Reblaus und der Pfropfrebenweinbau. I. Derzeitiger Stand der Reblausfrage. II. Fragen zum Pfropfrebenweinbau. (**Phylloxera and the cultivation of grafted vines. I. The present position [in Germany]. II. Problems of vine growing [in Germany].**)
Weinberg u. Keller, 1954, **1**: 167-72, 205-11.

d BOEHM, R. F.
Atomic irradiation of blueberries.
[*Proc.*] *23rd annu. Blueberry Open House*, N.J. agric. Exp. Stat., 1955, pp. 9-10.
Chronic irradiation from radio-active cobalt to produce mutations; no results yet.

e BOSIAN, G.
Die Unterlagsrebsorten im pfälzischen Weinbau. (**Rootstock varieties in the vineyards of the Palatinate.**) [English summary 4 lines.]
Mitt. Klosterneuburg, Ser. A, 1955, **5**: 135-43.

f BRINGHURST, R. S.
Strawberry growing in California.
Market Grs' J., 1955, **84** (3): 20-1, illus.

g DARROW, G. M.
Comparison of blueberry varieties for New Jersey.
[*Proc.*] *23rd annu. Blueberry Open House*, N.J. agric. Exp. Stat., 1955, pp. 13-14.

h DURAND-GASSLIN, L., AND MEISSONNIER, F.
Le marc de raisin. (**Grape residue.**)
Bull. hort. Liège, 1955, **10**: 49-51, illus.
Preparation of compost from grape residue.

i GRAVES, A. H., AND NIENSTAEDT, H.
Chestnut breeding. Report for 1953.
44th A.R. north. Nut Grs' Ass. 1953, Rochester, N.Y., pp. 136-44, illus.

j HATANO, K.
On the amino acids in the seeds of *Carya pecan.*
Trans. 63rd Mtg Jap. For. Soc., 1954, pp. 84-6, from abstr. in *Rec. Res. Fac. Agric. Univ. Tokyo*, 1953/54 [issued February 1955], **IV**, No. 135.

k KOLESNIKOV, V. A.
Nut-bearing trees in the USSR. [Russian.]
Priroda, 1955, **44** (2): 31-6, bibl. 3, illus.
Notes on cultivated and forest trees producing nuts and their distribution.

l LEMKE, E. W.
The Burbank Royal hybrid walnut as a rootstock.
45th A.R. north. Nut Grs' Ass. 1954, Lancaster, Pa, pp. 44-6.
Recommended for its vigorous growth.

m LOGOTHETIS, B.
La viticoltura e i vitigni dell'Egeo sud-orientale. (**The viticulture and vines of the south-eastern Aegean.**)
Atti Accad. ital. Vite, 1954, **5**: 458-76, bibl. 9, illus.
In Rhodes, Kos, and other islands in the Dodecanese and Cyclades groups.

n LÖHR, L.
Seilzugverwendung am Rebhang. (**The use of winches in vineyards on steep slopes.**) [English, French, Spanish summaries 7 lines each.]
Mitt. Klosterneuburg, Ser. A, 1955, **5**: 57-20, bibl. 5, illus.

o MORETTINI, A.
La sultanina bianca quale uva da mensa e da appassire nell'isola di Creta. (**Sultanina Bianca as a dessert grape and as a raisin in Crete.**)
Riv. Ortoflorofruttic. ital., 1955, **39**: 4-12, illus.

p MORTON, J. F., AND RUSSELL, O. S.
The Cape gooseberry and the Mexican husk tomato.
Proc. Fla St. hort. Soc. for 1954, pp. 261-6, bibl. 24, illus.
Physalis peruviana and *P. ixocarpa*; a review.

q NICKE, W.
Die Unkostenentwicklung im Weinbau. (**Costs in vine growing.**)
Weinberg u. Keller, 1954, **1**: 277-81.
In the Rhineland.

r NORD, O.
Die Eignung und Wirtschaftlichkeit der Seilwinden im Weinbau. (**Use and economics of winches in the vineyard.**)
Weinberg u. Keller, 1954, **1**: 130-3.

s OCHS, G.
Wuchsstoffe und ihre Anwendung im Weinbau. (**Growth substances and their application in viticulture.**)
Weinberg u. Keller, 1954, **1**: 221-5, bibl. 24.
For grafting and cuttings, but not for the control of coulure.

t VON PUTZER, P.
Gli effetti dell'irrigazione sulla vite e sul vino nella zona collinare della conca di Bolzano. **(Effects of irrigation on the vines and wine in the hill zone of the Bolzano basin.)**
Atti Accad. ital. Vite, 1954, **5**: 250-3.

u SHAH, J. J.
Phloem fibre in the tendril of *Vitis repens* W. and A.
Sci. and Cult., 1955, **20**: 390-1, bibl. 5, illus.

v SKLJAROV, I. I.
A machine for digging holes. [Russian.]
Vinodelie i Vinogradarstvo, 1955, No. 2, pp. 45-6, illus.
A tractor-mounted borer briefly described and illustrated prepares planting holes for vines.

w STANSFIELD, G. H.
Strawberries for market.
Agriculture, Lond., 1955, **62**: 73-5, illus.
Advice on picking, grading, packing and packing sheds.

x TOFANI, M.
Determinazione del costo di produzione dell'uva e del vino in Italia in rapporto all'indagine dell' O.I.V. **(Calculation of the cost of production of grapes and wine in Italy in connexion with the investigation of the Ufficio Internazionale del Vino.)**
Atti Accad. ital. Vite, 1954, **5**: 348-98.

y VICTOR, B.
Neue Maschinen und Geräte für den Weinbau. **(New machines and implements for the vineyard.)**
Weinberg u. Keller, 1954, **1**: 366-71, illus.
At the Viticultural Congress at Heilbronn in 1954.

z ZIMMERMANN, J.
Über die Züchtung frostresistenter Rebsorten. **(On the breeding of frost resistant vine varieties.)**
Weinberg u. Keller, 1954, **1**: 179-82, illus.
At Staatl. Weinbau-Inst. Freiburg/Br.

PLANT PROTECTION OF DECIDUOUS FRUITS.

General.

(*See also* 2742, 2760-2765, 3377, 3390, 3408p.)

2578. DEUTSCHER PFLANZENSCHUTZDIENST.
Jahresberichte der Pflanzenschutzämter 1953. **(Annual Reports of the Institutes of the West German Plant Protection Service for 1953.)**
Biologische Bundesanstalt für Land- und Forstwirtschaft, Braunschweig, 1955, pp. 144, bibls.

The "Länder" of the Federal German Republic report on pest and disease incidence in their areas and on the activities of the Plant Protection Service which is based on 17 institutes.

2579. FERNÁNDEZ VALIELA, M. V., BAKARCIC, M., AND TURICA, A.
Manual de enfermedades y plagas de los frutales y forestales en el delta del Paraná. **(Manual of diseases and pests of fruit and forest trees in the Paraná delta.)**
Publ. Misc. Minist. Agric. Ganad. B. Aires **400**, 1954, pp. 192, bibl. 24, illus.

Information is given on the diseases and pests of plum, citrus, peach, apple, quince, pear, vine, casuarina, pines, eucalypts and other trees and their control. There is a chapter on fungicides and insecticides, and spray calendars are given for (*a*) peach, (*b*) apple, pear and quince, and (*c*) vine.

Diseases of nutritional, physiological or unknown origin.

(*See also* 3380.)

2580. SOTOMAYOR ROMAN, I.
Ensayos preliminares en Chile sobre diagnóstico de deficiencias nutritivas en los vegetales por medio de inyecciones. **(Preliminary experiments in Chile on the diagnosis of nutritional deficiencies in plants by means of injections.)** [English summary 4 lines.]
Agric. téc. Chile, 1953, **13**: 155-8, bibl. 5.

Using Roach's techniques [*H.A.*, 15: 529] Fe, Mn and P deficiencies were found in apple, cherry and lemon trees growing on alkaline, alluvial soil at the Quinta Nacional de Agricultura, Santiago.

2581. FRITZSCHE, R.
Über die Korkkrankheit an Glockenäpfeln. **(Internal cork disease in the apple variety Glockenapfel.)**
Schweiz. Z. Obst- u. Weinb., 1955, **64**: 193-8, bibl. 1, illus.

Storage losses due to internal cork have been serious in Switzerland in recent years, especially in the apple variety Glockenapfel. The symptoms of the trouble and the conditions under which it occurs are described. Soil injection of fertilizer solutions containing borax, the replacement of Thomas meal by superphosphate for the manuring of cover crops on alkaline soils and the addition of 0·2% boric acid to the first or second post-blossom spray are the measures recommended for control of the disease.

2582. JOHNSON, F., AND OTHERS.
Fall application of boron sprays as a control for blossom blast and twig dieback of pears.
Phytopathology, 1955, **45**: 110-14, bibl. 13, illus.

A blossom blast and twig dieback of pears due to boron deficiency was cured by a single cover spray in October of 3% borax or 1% or 2% Polybor. June spraying gave variable results. Varieties susceptible to the disorder are Bartlett, Anjou and Bosc.—W. Wash. Exp. Stat., Puyallup.

2583. GÄRTEL, W.
Untersuchungen über Borschäden an Reben. **(Studies on boron injury to vines.)**
Weinberg u. Keller, 1954, **1**: 329-35, illus.

Following the observation that boron deficiency is widespread in German vineyards [*H.A.*, 24: 2404], the effect of excessive boron applications was studied in a series of experiments. Symptoms of boron injuries to foliage and pollen tubes are illustrated, and analytical data are tabulated on the B content of stigmata, carpels, sap, wood and leaves in relation to B dosage and symptoms of toxicity. Figures are also given on the sugar, phosphoric acid and potassium contents of leaves from vines receiving various B treatments.—Biol. Bundesanst., Bernkastel-Kues/Mosel.

2584. Gollmick, F.
Untersuchungen über die Blattbräune (Melanose) der Reben. **(Research on leaf-browning (melanose) of vine.)**
Phytopath. Z., 1955, **23**: 249-322, bibl. 134, illus.

The author reviews and discusses the results of research on melanose of vine. Many wine varieties show necrotic leaf spotting before autumn colouring. Histological and cytological research has failed to show a parasitic causal agent. The occurrence of the spotting is strongly influenced by external conditions, of which those promoting wood ripening result in earlier and more severe attacks. The author considers that this "false melanose" is a manifestation of age, its primary cause being an acute Ca deficiency in the mature leaves.

2585. Anon.
Contre la chlorose ferrique. **(The control of iron chlorosis.)**
Arboric. fruit., 1955, No. 13, p. 17.

Spraying with 0·8% chelate of iron together with ethylenediamine tetra-acetic acid completely cleared chlorosis in both pear and apple in tests in the Inde-et-Loire Département, two applications being necessary in severe cases. Trunk injections of iron sulphate and citric acid in the proportion of 4 to 1 gave equally good results but the iron chelate treatment is much simpler and acts more quickly. A 1% iron chelate spray caused slight leaf burn in pear. A single annual preventive 0·8% spray is recommended in orchards liable to chlorosis.

2586. Trocmé, S., and others.
Chlorose des poiriers en sols calcaires. **(Chlorosis of pear trees in lime soils.)**
Ann. agron., 1954, **5**: 887-90.

All the iron compounds injected as solids into the stems of chlorotic pears improved the condition of the tree, but iron and potassium tartrate and iron lactate seemed to induce more intensive re-greening than the rest. Although all treatments caused scorching, the trees recovered satisfactorily in the course of the season. Pears with stem diameters over 10–15 cm. required injections in more than two or three places to induce re-greening in all parts of the tree. The effect of the treatment was studied during one season only, but observations of growers in the Paris area suggest that it extends well into the second season. Injections during the dormant period were capable of preventing the incidence of chlorosis and caused less scorching than injections during the growing season. Soil applications of iron and pre-blossom or foliage sprays proved less effective than injections of solid iron compounds.—Versailles.

2587. Trocmé, S.
Valeur fertilisante d'une substance vitrifiée renfermant des oligoéléments. **(The manurial value of a glass frit containing plant nutrients.)**
Ann. agron., 1954, **5**: 851-2.

A glass frit of specified composition failed to cure manganese deficiency in beans or iron deficiency in chlorotic pears. Symptoms of manganese deficiency appeared at the same time and in the same intensity as in untreated beans, while plants supplied with a little Mn remained healthy.—Versailles.

2588. Samish, R. M.
A contribution to the knowledge of lime induced chlorosis in grape vines.
Plant Analysis and Fertilizer Problems, [1955], pp. 156-65, bibl. 36, illus., I.R.H.O. Paris, being part of *Proc. 8th int. bot. Congr. 1954.*

Lime-induced chlorosis was found to be the cause of delayed foliation, reduced shoot and leaf growth, reduced pollen germination and thus development of shot berries in Madeleine Oberlin vines. The most effective control was to spray 10% $FeSO_4$ on the fresh pruning wounds in early spring. Leaf chlorophyll content, degree of pollen germination, yield and shoot growth were directly related to amount of "active" and total Fe in the leaf. NAA when sprayed on leaves increased their content of active Fe and therefore of chlorophyll.—Agric. Res. Stat. and Hebrew Univ., Rehovot.

2589. Drouineau, G., and Mazoyer, —.
Carence du framboisier en manganèse. **(Manganese deficiency in strawberries.)**
Ann. agron., 1954, **5**: 844-5.

The Mn content of strawberry leaves from plants showing symptoms of manganese deficiency was 27 p.p.m., as against 52 p.p.m. in healthy plants. The soil bearing healthy strawberry plants had a manganese content of 2·2 p.p.m., while deficient plants grew in a soil containing only 0·9 p.p.m. Mn.—Antibes.

2590. Delmas, H.-G.
Le dépérissement des cerisiers de l'arrondissement de Céret. **(Cherry decline in the Céret district.)**
C.R. Acad. Agric. Fr., 1955, **41**: 333-5, reprinted in *Progr. agric. vitic.*, 1955, **143**: 345-9, bibl. 10.

A common cherry decline in the Céret district of the Pyrénées-Orientales is due partly or wholly to zinc deficiency which is controlled by 2–3 3% zinc sulphate foliage sprays at fortnightly intervals beginning at budburst.

2591. Ciferri, R., and others.
La leptonecrosi nutrizionale del pesco. **(Nutritional phloem necrosis of the peach tree.)** [English summaries 5 and 6 lines.]
Ann. Sper. agrar., 1955, **9**: 45-76, illus., 235-62, bibl. 24.

Subjects discussed are geographical distribution in Italy, varieties affected, environmental conditions, age of affected plants, severity of attack, symptoms in the chronic and acute forms, histology of affected tissue, and control experiments made in various parts of Italy in 1951/53. It is concluded that the disorder is due to phosphorus and potassium deficiency. Details are given of manurial and fertilizer treatment which gives almost complete control.—Lab. crit. ital., Pavia; Osserv. fitopat, Veneto, Verona; and Staz. chim.-agrar. sper., Udine. [For shorter account see *H.A.*, 25: 1432.]

2592. Hélias, M.
Carence en potasse chez des pommiers a cidre. **(Potassium deficiency in cider apples.)**
Ann. agron., 1954, **5**: 834-5.

Many cider apple orchards on the north coast of France show symptoms of potassium deficiency. Data are tabulated on the dry matter, K_2O, CaO, MgO and $K_2O + MgO$ content of leaves and fruits (skin, flesh, seeds) on healthy and affected branches. The K_2O content of leaves from branches exhibiting deficiency symptoms was 0·40–0·80% of the dry matter, while that of leaves from healthy parts of the tree ranged from 0·80 to 2·50%.—Quimper.

2593. Gilbert, F. A.
Potash prevents "curl leaf" of sour cherries.
Bett. Crops, 1955, **39** (4): 6-10, 46-8, bibl. 3, illus.

Good recovery from curl leaf on Montmorency cherry trees was achieved in Wisconsin with 0-10-30 and 0-0-60 fertilizers. Straw mulch alone was also effective but with severe curl leaf symptoms an addition of K appears desirable to speed up recovery. Treatment with N alone caused aggravation of curl leaf.

2594. McWhirter, K. G.
"June yellows": a cytoplasmic mutation in the cultivated strawberry.
From abstr. in *Heredity*, 1955, **9**: 151-2.

The author's experimental work tends to substantiate and possibly to expand the hypothesis that "June yellows" is the result of cytoplasmic mutation. The symptomatology and histology of "June yellows" show a strong influence of cell-lineage. Intra-clonal crosses of Auchincruive Climax show strong matrocliny, though pollen influence is appreciable. The passage of "June yellows" through several semi-stable stages and the aggravation of symptoms in experimental material during the reproductive cycle emphasize the analogy with neoplasms.—Dep. Zool., Univ. Museum, Oxford.

2595. Pejkić, B., and Vasiljević, L.
Some causes of necrosis in peaches. [Serbian, with French summary ¾ p.]
Rev. Res. Work Fac. Agric. Belgrade, 1954, **2** (1): 148-63, bibl. 9, illus.

Investigations into necrosis of peach trees showed that *Cytospora leucostoma* hastens the appearance and increases the amount of necrosis but is not the primary cause of it. Necrotic areas were found to contain a higher percentage of resin than healthy ones. Of 4 varieties analysed, affected branches of Hale's Early had the highest resin content. The disorder was reduced but not entirely prevented by the use of grafting wax on pruning wounds, though the presence of air had no effect on the incidence of necrosis. On affected trees the lower branches were more vigorous than the upper.

2596. Durquéty, M.
Anomalies pigmentaires et morphologiques chez *Vitis vinifera* L. **(Abnormalities of colouring and morphology in *Vitis vinifera*.)**
Progr. agric. vitic., 1955, **143**: 257-66, illus.

An account is given of different types of mosaic, variegation, and leaf and shoot abnormality observed during 4 years of selfing and crossing a number of varieties. The incidence of such abnormalities, their transmission and the means of avoiding them by sowing seed from normal plants is discussed.

Climatic factors.

(*See also* 2324-2327, 2330, 2411d, 2438, 2439, 2482.)

2597. Kemmer, E., and Schulz, F.
Das Frostproblem im Obstbau. **(Frost problems in fruit growing.)**
Bayerischer Landwirtschaftsverlag, Munich, 1955, 9½ × 7 in., pp. 96, bibl. 6 pp., illus.

In their comprehensive and critical review, published on the occasion of the 25th anniversary of the founding of the Institut für Obstbau, Berlin, the authors survey the manifold frost problems in fruit growing under the following headings: *A. Spring frost:* General remarks; the effect of frost; frost incidence and locality; frost protection. *B. Winter injury to the wood and root:* General remarks; definition of the term "severe winter"; history of noteworthy winters; physico-chemical and physiological processes in the plant; loci of frost damage; the influence of tree condition and locality on frost resistance; responses of species, varieties, rootstocks and stem-builders; the question of freezing trials.

2598. Shepard, P. H.
The kernel told the tale.
Amer. Fruit Gr, 1955, **75** (5): 37.

The effect of 3 hours of frost (29° F.) in May on peach fruits was studied at Mountain Grove Fruit Experiment Station, Mo. The peaches were ½ to ¾ in. in diameter at the time. The larger fruits sustained less injury than the smaller ones. In almost all cases the membranous seed coat had turned brown, and where this had happened the embryo aborted and no kernel developed. The fruit, however, grew and matured to almost normal size and shape without a live embryo. Examination of 1,848 peach pits at harvest time showed that only 8 had normal kernels, the remainder having shrivelled kernels or no kernels at all. The skin of a few varieties, particularly Redhaven, was affected by the frost, developing small cracks resembling curculio punctures. The fruit developed a slightly greater point and was slightly smaller than usual.

2599. Kronenberg, H. G.
Nachtvorstschade aan zwarte bessenrassen in 1954. **(Night frost damage to black currant varieties in 1954.)**
Fruitteelt, 1955, **45**: 400-1, illus.

The effects of a −5° C. frost just before flowering were studied on a wide selection of black currant varieties growing in the east Netherlands. Serious damage was sustained in the Baldwin and Boskoop groups, though their hybrids suffered less. The Goliath and French groups showed better frost resistance. Hybrids of

Baldwin × Goliath varied in susceptibility. Striking frost resistance was shown by Brödtorp (a Finnish variety) and by the Canadian varieties Crusader, Coronet and Consort.—I.V.T., Wageningen.

2600. ELAM, F. L.
Mobile heater.
Amer. Fruit Gr, 1955, **75** (3): 58, illus.

Fans mounted on a 2-wheeled trailer distribute warm moving air from propane or butane burners over an orchard area of 20 acres.

2601. VAN EIMERN, J.
Frostschutz mittels Propeller. **(Frost protection by fan.)**
Mitt. dtsch. Wetterdienst., 1955, Vol. **2**, No. 12, pp. 30, bibl. 20, illus.

A fan was erected in an apple orchard at Ottensen, Altes Land, where trials were carried out jointly by the German Meteorological Service and the Jork Fruit Research Station. During the experimental period, 1953-54, the fan was in operation on 7 nights, but its efficacy in raising the temperature could not be fully explored as no frost damage occurred in unprotected parts of the orchard. Detailed records are presented from which on the whole favourable, though only preliminary, conclusions are drawn. [See also *H.A.*, 24: 1315.]

2602. HARRIS, R. W., AND GRIGGS, W. H.
Russeting of Bartlett pears.
Calif. Agric., 1955, **9** (3): 5-6, illus.

Trials and observations have shown that russeting of Bartlett [Williams] pears is not caused by copper dusts applied to control blight. Trees sprayed with 100 p.p.m. streptomycin and unsprayed trees showed similar amounts of russeting to those dusted with copper. By contrast, fruit protected by bagging showed significantly less russeting, and this suggests that unfavourable weather conditions are primarily responsible.

2603. BEEFTINK, W. G.
Examination of soils and crops after the inundations of 1st February, 1953. III. Sensitivity to salt of inundated fruit crops.
Neth. J. agric. Sci., 1955, **3**: 15-34, bibl. 16.

Characteristic symptoms of salt water flood damage are described for apples, pears, plums, cherries, currants, gooseberry, walnuts, grapes and mulberries. In general the crops showed symptoms of drying out, indicating their inability to absorb enough water. A table of the approximate sensitivity of the fruit crops, and also of apple and pear varieties was compiled; there was a wider range of sensitivity in apples than in pears. The sensitivity of the chief Malling rootstocks did not appear to run parallel to their vigour. The salt content of the soil moisture was the limiting factor for apple and pear recovery; 7–8 g. per litre for apples, and 11–12 g. for pears were the limits beyond which trees could not be saved. Flooding had no influence on the growth condition of apples and pears until after it had lasted 8 or 9 weeks. Tree age had no clear effect on sensitivity, though apple trees of 25 years and over had less resistance. Deep cultivation before flooding, soil exhaustion, and general neglect had detrimental effects on tree resistance.

Viruses.

(*See also* 2734k-m, w, 2735e, 3403.)

2604. SMITH, K. M., AND LAUFFER, M. A. [Editors].
Advances in virus research, Vol. II.
Academic Press Inc., N.Y., 1954, 9½ × 6½ in., pp. 312, 56s. or $ 7.

This volume includes critical review articles by F. O. Holmes on Inheritance of resistance to viral diseases in plants, and by F. C. Bawden on Inhibitors and plant viruses.

2605. HARRIS, R. V.
Virus diseases and the fruit farmer.
J. roy. agric. Soc., 1954, **115**: 83-97, bibl. 44, illus.

This review of work on virus diseases in top and small fruit concludes with a plea for the introduction of health certificates for all fruit crops in Great Britain.

2606. TOMLINSON, N., AND WOODBRIDGE, C. G.
Evaluation of a colorimetric and ultraviolet absorption test for diagnosis of plant virus diseases as applied to stone and small fruits.
Canad. J. agric. Sci., 1955, **35**: 111-23, bibl. 29.

The method of Lindner *et al.* [*H.A.*, 22: 3573] for the diagnosis and study of plant virus diseases has been investigated in connexion with certain of these diseases occurring in British Columbia. Test results did not correspond with indexing of diseased cherry trees. The test failed to distinguish virus-infected cherry trees from healthy trees, cucumber plants infected with a latent virus of cherry from healthy cucumbers and virus-infected black raspberry and strawberry plants from healthy plants. The test may be applied to distinguish healthy peach leaves from those infected with western X-disease during part of the growing season, but its specificity in this connexion is uncertain. The slow spread of this virus in a tree renders adequate sampling for early detection of infection very difficult. Evidence has been obtained which indicates that polyphenols, pentose sugars and hydrolysis products of pentose nucleic acids are concerned in the test results. The ultraviolet absorption spectra of test solutions considered by Lindner *et al.* to be indicative of healthy plants are due principally to pentose nucleic acid hydrolysis products, while the spectra of test solutions supposedly indicative of virus infections are due principally to polyphenols and pentose sugars. Both types of solutions contain all three components, but in different proportions. [Authors' abstract.]—Canad. Dep. Agric., Summerland, B.C.

2607. VAN KATWIJK, W.
Ruwschilligheid bij appels, een virusziekte. **(Rough skin in apples, a virus disease.)** [English summary ¼ p.]
Tijdschr. PlZiekt., 1955, **61**: 4-6, bibl. 5, illus.

Rough, corky, brown spots have been observed on fruits of mature trees of Belle de Boskoop and Glorie van Holland. The roughness may also occur as rings or stripes, and in severe cases may cause fruit malformation; infected fruits are smaller than normal.

Graft transmission trials have shown that the disease is of virus origin. The name *Pyrus virus 8* is proposed.—PlZiekt. Dienst, Wageningen.

2608. Mulder, D.
Ruwschillige vruchten en een bladsymptoom bij appel. **(Rough skin symptoms on fruit and leaf of apples.)** [English summary ½ p.]
Tijdschr. PlZiekt., 1955, **61**: 11-14, bibl. 8, illus.

The appearance of rough skin symptoms on fruits is described for Belle de Boskoop, Glorie van Holland, Dijkmanszoet, Golden Delicious and Notaris. Rough skin may also be caused on fruits of Belle de Boskoop by a genetic abnormality resulting in large areas of corkiness and deep cracks, which distinguishes it from the less severe effects of the virus. There are certain similarities between symptoms of rough skin reported in the Netherlands and those of diseases reported from Denmark, Germany and Switzerland, and of green crinkle from New Zealand. Irregular vein-clearing was observed on the terminal leaves of shoots of infected trees, especially of Glorie van Holland; this symptom was experimentally transmitted by grafting to healthy trees.—I.P.O., Wageningen.

2609. Fischer, H.
Ungewöhnliche Berostungen und Rissbildungen bei Boskoop, Glockenapfel und anderen Apfelsorten, eine Viruskrankheit? **(Unusual russeting and cracking in Boskoop, Glockenapfel and other apple varieties, a virus disease?)**
Schweiz. Z. Obst- u. Weinb., 1955, **64**: 125-31, bibl. 5, illus.

A skin trouble of apple fruits is described which cannot be attributed to either spray damage or nutrient deficiency. It occurs chiefly, though not exclusively, in Belle de Boskoop and Glockenapfel, and is characterized by russeting, necrotic areas and cracking. Affected trees often bear a high percentage of fruits showing these blemishes. Reference is made to recent reports of similar symptoms in southern Switzerland, Holland, Germany and Denmark, but it is not known whether the underlying cause is the same in all these cases. Certain observations by Swiss growers suggest that the trouble is graft-transmissible.

2610. Palmiter, D. H., and Parker, K. G.
Transmission of the causal agent of apple green mottle.
From abstr. in *Phytopathology*, 1955, **45**: 186.

Grafting tests indicate that apple green mottle, which spreads slowly in commercial orchards, is probably a virus disease and that fruit symptoms may not appear until several years after infection occurs.

2611. Woodhead, C. E.
Seasonal fluctuation and incidence of ring spot on Granny Smith apples.
N.Z. J. Agric., 1955, **90**: 283-6, illus.

Observations on the behaviour of ring spot were made in orchards of Auckland, Hastings and Nelson. Symptoms in severely affected trees were persistent, but were not manifested each year. In moderately affected trees symptom non-appearance was more frequent, but there was no case of crop infection progressing from moderate to severe during the 4 years of study. As yet the disease is of economic significance only in some orchards. Careful selection of budwood is important for control.

2612. van Katwijk, W.
Ringvlekkenmozaiek, vergeleken met enkele andere mozaiekverschijnselen bij peer. **(Ring pattern mosaic, compared with some other mosaic symptoms on pears.)** [English summary ½ p.]
Jaarb. PlZiekt. Dienst, Wageningen 1953, 1954, pp. 244-8, bibl. 9, illus., being *Meded.* **124.**

Mosaic, veinlet chlorosis and ring pattern mosaic have been found on pears in the Netherlands. Pear scions grafted on stocks infected with stony pit showed symptoms of both stony pit and veinlet chlorosis. The symptoms of this virus are light yellowish-green oval rings or waves; in severe cases the rings may become necrotic. Differences in varietal susceptibility were noticed. Zoete Brederode, Beurré d'Anjou and Nouveau Poiteau showed severe symptoms; Seigneur d'Esperen, Maagdepeer, and Beurré Hardy also showed symptoms but without necrosis.

2613. Kunze, L.
Weitere Untersuchungen über Viruskrankheiten und andere Abbauerscheinungen der Süsskirsche. **(Further studies on virus diseases and other symptoms of decline in sweet cherries.)**
Reprinted from *Pflanzenschutz*, 1954, No. 8, pp. 8, bibl. 14, illus.

Grafting experiments proved that the decline of cherries at the village of Niederspay near Boppard (Rhine) is caused by a strain of the Pfeffinger virus, while similar symptoms at the neighbouring village of Oberspay may be due to climatic and nutritional factors, possibly zinc deficiency.—Biol. Bundesanst. Berlin-Dahlem.

2614. Evenhuis, H. H.
Over de cicadellidenfauna van de kers. **(Observations on leafhoppers of cherry.)** [English summary 11 lines.]
Tijdschr. PlZiekt., 1955, **61**: 56-9, bibl. 10.

In a study of possible vectors of Eckelrader virus, 5 leafhopper species were found to breed regularly on cherry.

2615. Gilmer, R. M.
Relationship of anthocyanosis in X-diseased *Prunus* species to the carbohydrate content of leaves.
From abstr. in *Phytopathology*, 1955, **45**: 184.

Initial studies carried on in 1952-53 indicated that production of anthocyanosis in X-diseased chokecherry trees (*Prunus virginiana*) was related to the accumulation of carbohydrates in the leaves. Additional trials with 4 *Prunus* clones in 1954 supplied confirmatory data. In all 4 infected clones there was a marked increase in the amount of foliar carbohydrates, beginning approximately 8 weeks after budbreak. Non-infected controls of the same clones showed no marked increase in foliar carbohydrate content. Total carbohydrate accumulation was greatest in infected chokecherry which ultimately expressed anthocyanosis, somewhat less in *P. sieboldi* in which the symptoms of X-disease did not include anthocyanosis, and least in 2 symptomless carriers of the virus, *P. americana* and *P. domestica* var. Ackerman.

2616. Millikan, D. F., and Anderson, J. R.
The phony peach virus in Missouri.
Plant Dis. Reptr, 1954, **38**: 834-5.

The results of 24 years of inspection for and removal of phony-peach-infected peach trees in Missouri indicate that the spread of the virus can be economically controlled. At the present time all counties but one have been removed from the quarantine list and the low annual infection found in the quarantined county emphasizes the value of this program. [Authors' summary.]—Univ. Missouri and Missouri St. Dep. Agric.

2617. Flock, R. A., and Wallace, J. M.
Transmission of fig mosaic by the eriophyid mite *Aceria ficus*.
Phytopathology, 1955, **45**: 52-4, bibl. 11, illus.

Fig mosaic was shown to be transmitted by the eriophyid mite *Aceria ficus* (Cotte), and not to result from toxicogenic feeding. Non-viruliferous mites were found to be highly destructive to fig trees but not to cause typical mosaic symptoms. Fig mosaic was found to be present on all fig trees examined in the field in California. [From authors' summary.]—Univ. Calif. Citrus Exp. Stat., Riverside.

2618. Hutchinson, M. T.
An ecological study of the leafhopper vectors of blueberry-stunt.
J. econ. Ent., 1955, **48**: 1-8, bibl. 13, illus.

It was earlier reported [see *H.A.*, 21: 2438] that the physically similar leafhoppers, *Scaphytopius* (*Cloanthanus*) *magdalensis* and *S.* (*C.*) *verecundus* are both vectors of blueberry stunt. The present study indicates that *S. magdalensis* is a vector of stunt disease while *S. verecundus* is not.—N.J. agric. Exp. Stat.

2619. Maramorsch, K.
Transmission of blueberry-stunt virus by *Scaphytopius magdalensis*.
J. econ. Ent., 1955, **48**: 106, bibl. 1.

From the findings it appears likely that *S. magdalensis*, but not *S. verecundus*, is responsible for the spread of blueberry stunt in New Jersey.

2620. Miller, P. W.
Inactivation of non-persistent viruses in strawberry plants by hot-air treatments.
Plant Dis. Reptr, 1954, **38**: 827-33, bibl. 2, illus.

Certain non-persistent strawberry viruses (crinkle or yellows virus complexes or both) were inactivated in infected plants by hot-air treatment. Treatments ranged from 48 hours at 33–35° C. to 256 hours at 37–39° C. A temperature-time period that gave relatively high percentages of plants free from non-persistent viruses (87%) and of plant survival (65%) was 36°–38° for 194 to 288 hours. Some 482 plants were heat-treated; 206 of these survived and out of them 166 were found on testing to be free of non-persistent viruses. The relative heat-sensitivity of the 12 varieties tested is indicated. [From author's abstract.]—Ore. agric. Exp. Stat. and U.S.D.A.

2621. Gärtel, W.
Panaschüren bei Reben. (**Variegation in vines.**)
Weinberg u. Keller, 1954, **1**: 137-45, bibl. 31, illus.

Variegation of the foliage has been observed in the vineyards of the Moselle, the Ahr and the Rhine. This discoloration is distinct from any symptoms caused by fungus diseases, pests or nutritional disturbances but resembles that described elsewhere as characteristic of infectious degeneration. In Germany variegation is associated with the "Reisig" or broom disease and with the presence of rods in the wood cells. It must be assumed that infectious degeneration and broom disease are expressions of the same pathological condition with symptoms somewhat modified by environment and cultural practice.

2622. Cosmo, I., and Pieri, G.
Indagini sulla degenerazione infettiva della vite. (**Investigations on infectious degeneration of the vine.**)
Atti Accad. ital. Vite, 1954, **5**: 401-44, bibl. 26, illus.

Symptoms, transmissibility by soil, phylloxera and grafting, effects of fertilizers and mineral elements, of foliar application of minor elements, and of cover-spraying healthy and infected plants with growth substances, pattern of spread within a vineyard, correlation between external characters and the presence of endocellular cords are discussed.

2623. Hall, B., and Hewitt, W. B.
An attempt to use a color reaction test to identify virus-diseased grapevines.
Plant Dis. Reptr, 1955, **39**: 150-1, bibl. 5.

A reagent containing lime, copper sulphate and sodium citrate did not give satisfactory identification of the presence of yellow mosaic plus fanleaf in dormant stem sections of vine.

Bacteria.

(*See also* 2524, 2662, 3031.)

2624. Goodman, R. N.
Fireblight control with sprays of agri-mycin, a streptomycin-terramycin combination.
Plant Dis. Reptr, 1954, **38**: 874-8, bibl. 6.

Effective control of fireblight on the highly susceptible Jonathan variety was obtained with 3- or 4-spray treatments with 50 or 100 p.p.m. or a 4-spray treatment with 25 p.p.m. agri-mycin applied in April/May at 4-day intervals between sprays. A 2-spray treatment with 100 p.p.m. was not particularly effective where secondary infection was a problem. Although secondary blight was severe in several plots, trees receiving 4 or 3 sprays, at 100 or 50 p.p.m. remained relatively free from these late infections for as long as 30 days after the first primary infections were observed. Eradicative antibiotic sprays applied 2–5 days after primary blight was observed failed to provide adequate control. At best this treatment served only to delay the spread of secondary infection. Fruit set, development and finish were not impaired by as many as 6 antibiotic sprays at concentrations as high as 100 p.p.m. Slight marginal chlorosis of foliage, which has been established as being streptomycin-induced, was occasionally observed where antibiotic sprays were applied at 100 and 50 p.p.m. At the 25 p.p.m. level this chlorosis was not evident.—Univ. Missouri, Columbia. [See also *H.A.*, 25: 308.]

2625. Clayton, C. N.
Streptomycin for fire blight control on apple in North Carolina.
Plant Dis. Reptr, 1955, **39**: 128-31, bibl. 4, illus.

Five streptomycin formulations, applied three times during flowering, were compared for the control of fireblight (*Erwinia amylovora*) on inoculated trees of several apple varieties. Agrimycin-100 (15% streptomycin plus 1·5% terramycin), streptomycin nitrate, and soluble streptomycin sulphate were effective, giving 0·7, 0·5 and 2·0 blighted spurs or terminals per tree at 100 p.p.m., while the first 2 gave 6·0 and 8·0 respectively at 50 p.p.m. and the control 17·5.—N.C. St. Coll., Raleigh.

2626. Mills, W. D.
Fire blight development on apple in Western New York.
Plant Dis. Reptr, 1955, **39**: 206-7.

An experimental schedule for the control of fire blight (*Erwinia amylovora*) with streptomycin in western New York is given. It is based on a correlation between degree days (the sum of degrees above 60° F.) plus rain during bloom and severity of blight.—N.Y. St. Coll. Agric., Ithaca.

2627. Winter, H. F.
Fire blight can be controlled.
Amer. Fruit Gr, 1955, **75** (2): 38-9.

In 1952 greenhouse experiments with antibiotics showed that they were most effectively applied as water sprays. Orchard tests in 1953 were aimed at preventing blossom infection, therefore 2 full-bloom sprays were applied, followed by a petal-fall spray. The antibiotics were applied at 120 and 60 p.p.m., and the trees were inoculated to ensure a severe fire blight epidemic. Counts made 3 weeks after inoculation showed that in trees treated with 120 p.p.m. of streptomycin there was 2% blossom blight and no twig blight, while the controls showed 83% blossom and 20·6% twig blight. Extensive experiments in 1954 have shown that fire blight in both apples and pears was effectively controlled by spraying during flowering with streptomycin at 100 p.p.m.—Ohio agric. Exp. Stat. [See also *H.A.*, 24: 2446 and 25: 310.]

2628. Kienholz, J. R.
Control of fire blight on Forelle pears with antibiotics at Hood River, Oregon.
Plant Dis. Reptr, 1955, **39**: 208-9, bibl. 3.
Kienholz, J. R., and Dunegan, J. C.
Control of pear blight by antibiotic sprays.
Proc. Wash. St. hort. Ass. 1954, pp. 51-4, bibl. 8.

Five sprays of 100 p.p.m. streptomycin at 10-day intervals from 80% full bloom gave effective control on the extremely susceptible Forelle pear. The soluble and insoluble sulphate, the nitrate and a streptomycin-terramycin formulation gave equally good results. No fruit injury and only traces of leaf chlorosis occurred, whereas the copper sprays previously used caused severe russeting.—Hort. Crops Res. Branch, Agric. Res. Serv., U.S. Dep. Agric., Hood River, Oregon. The second paper contains another account of the Hood River experiment.

2629. Crosse, J. E.
Bacterial canker of stone-fruits. I. Field observations on the avenues of autumnal infection of cherry.
J. hort. Sci., 1955, **30**: 131-42, bibl. 13, illus.

Canker infections on cherry were found to be associated with wounds, fruiting spurs, and with nodes on 1-year-old wood. Evidence was found of the infection of spurs and nodes through leaf scars. Most branch cankers arose from the leaf scar infection of fruiting spurs. [From author's summary.]—E. Malling Res. Stat.

2630. Vaughan, E. K., and Boller, C. A.
Experiments on control of bacterial canker of blueberry.
Plant Dis. Reptr, 1954, **38**: 867-8, bibl. 1.

In 3 tests in 1952/54 8-8-10 bordeaux mixture gave satisfactory results against bacterial canker (*Pseudomonas* sp.) of blueberry, the percentage of diseased plants being 12·5–42·6 compared with 56–96 in the controls, and the average number of cankers per plant being 0·33–0·59 compared with 2·06–6·33. Tests in 1953–54 showed that other copper fungicides are also effective.—Ore. agric. Exp. Stat., Corvallis.

2631. Vaughan, E. K.
Three unusual manifestations of cane gall on cultivated blackberry.
Phytopathology, 1955, **45**: 56-8, bibl. 2, illus.

The manifestations were (1) an irregular type which affected the base of the fruit spurs of Himalaya blackberry; (2) a roughly spherical type which occurred on boysenberry canes; (3) natural infections of the foliage and flowers of Nectarberry. The bacteria involved in these types of infection were indistinguishable from those of the ordinary cane gall (*Agrobacterium rubi*). The morphological differences in the galls are presumed to be the result of environmental factors rather than genetic or other variations of the causal organism.—Ore. St. Coll., Corvallis.

Fungi.

(*See also* 2528, 2734u, w, y, 2735b.)

2632. Pavićević, B. M., and Stančević, A. S.
Osetljivost raznih sorti jabuka prema cadjavoj krastavosti. **(Susceptibility of various apple varieties to scab (*Venturia inaequalis*).)** [English summary ½ p.]
Arh. poljopr. Nauk., 1954, **7** (15): 106-13, bibl. 12.

The scab susceptibility of 88 apple varieties was investigated in 12 localities in Serbia. The degree of susceptibility was found to depend largely on growing conditions including weather, density of planting and soil management. Varieties practically resistant to scab included Jonathan and Ontario, while Winesap and Rome Beauty were among the most susceptible.

2633. Siebs, E.
Untersuchungen über die Schorfresistenz von Birnen. III. Stofflicher Hinweis auf die Grundlagen der Blattschorfresistenz. **(Studies on the scab resistance of pears. III. The chemical basis of scab resistance in leaves.)**
Phytopath. Z., 1955, **23**: 37-48, bibl. 11, illus.

The action of arbutin, tannins and hydroquinone on the development of *Venturia pirina* was studied *in vitro*. Tannins were ruled out as factors affecting scab resistance in pear leaves, but hydroquinone proved very toxic to the fungus if added to the nutrient medium. The significance of this compound was further emphasized by the finding that in resistant leaves it is present in higher concentrations than in leaves of susceptible pears. Arbutin had no fungistatic action, but it is thought to have an indirect bearing on scab resistance as it decomposes into hydroquinone and glucose. The hydroquinone content of the leaf is likely to be determined by enzymatic processes regulating the ratio of formation: decomposition: re-synthesis of arbutin. [The experimental methods are such that one cannot disregard the possibility of hydroquinone arising as an artefact.] [For Parts I and II see *H.A.*, 22: 1370 and 25: 1463.]—Max Planck Inst. f. Züchtungsforsch. (Erwin Baur-Inst), Voldagsen. D.S.K.

2634. Roosje, G. S.
Laboratoriumonderzoek over de biologie en de bestrijding van *Venturia inaequalis* Cke) Wint. **(Laboratory research on the biology and control of apple scab.)** [English summary to appear next issue.]
Meded. Dir. Tuinb., 1955, **18**: 139-51, bibl. 14, illus.

Tests were carried out on young grafted plants in pots and on nursery plants of M. II, which were artificially inoculated. The minimal time of leaf wetting for ascospore infection to occur was 8–9 hours at 17–20° C. The same time or longer was necessary for conidial infection. The incubation period lasted about 9–12 days. Satisfactory curative control was obtained on the grafted plants by applications of 0·07% AAventa (an organic Hg preparation), 0·2% dinitrorhodanbenzene, 0·3% captan, 0·2% ziram, and 0·2% TMTD, shortly after the start of the wetting period. On M. II plants 0·1% AAventa and 0·125% TMTD gave satisfactory control. For protective control of growing shoots sprays should be applied at intervals of less than 5 days. In rainy conditions 0·1% AAventa and 0·3% captan adhered better to the leaves than 0·2% Alvesco and 0·15% TMTD.

2635. Marshall, J.
Concentrate spraying for orchards.
A.R. Nova Scotia Fruit Grs' Ass. 1954, pp. 101, 103-7.

In current experiments by the Canada Department of Agriculture Science Service at Summerland the addition of a surfactant—a plastic-like, water-dispersible, non-ionic, surface-active, synthetic, organic compound—to the concentrate fungicidal spray mixture has reduced scab infection by about 50% compared with the same dosage of unmodified concentrate mixture. With the modified concentrates there was no heavy spotting of fruit on parts of the tree close to the air vent of the sprayer, and a uniform, barely visible film of fungicide extended well around the surface of the fruits that were not directly exposed to the spray blast. The spray deposit in the stem basin, so important in preventing rain-borne conidial, or summer, infection, seemed to be increased in quantity as well as improved in uniformity. Furthermore, although the quantity of deposit was not increased on the lower parts of the tree (in concentrate spraying there is commonly an unnecessarily heavy deposit on the lower branches), it was significantly increased on the upper branches, where coverage is generally lightest and the danger of wind-borne ascospore or spring infection may be greatest. Surfactants show 2 limitations: (1) they accentuate any tendency of a particular spray material to cause fruit or foliage injury; (2) only efficiently operated, high-velocity, turbine-type sprayers have given consistently good results with them.

2636. Statens Forsøgsvirksomhed i Plantekultur.
Forsøg med tåge- eller koncentrat-sprøjtning til frugttraeer. **(Experiments on low-volume spraying of fruit trees.)**
Erhvervsfrugtavl, 1955, **21**: 146-7.

In large-scale trials, carried out for 4 years, the application of wettable sulphur and other fungicides as concentrate sprays achieved as satisfactory control of apple scab and caused as little injury as did applications at normal concentrations. It is concluded that low-volume spraying is suited to Danish conditions.—Blangstedgaard.

2637. Hey, G. L.
Recent developments in apple scab control.
Comm. Gr, 1955, No. 3091, p. 684.
Unconventional spray programmes for scab.
Comm. Gr, 1955, No. 3092, pp. 743-4.
Scab control on pears.
Comm. Gr, 1955, No. 3093, p. 804.
The control of apple-mildew.
Comm. Gr, 1955, No. 3094, pp. 871-2.

Extensive observations were made on trials with captan in comparison with S and Hg sprays. In general, S sprays caused a reduction in crop weight and often induced russeting. Results with Hg were intermediate between those of S and of captan, which gave the best results in poor, unhealthy orchards. On Cox excellent results were obtained with captan, and scab control on Worcester, Laxton's Superb and Bramley was promising. Separate programmes are given for scab control on dessert varieties, Bramley, and Newton and Lane. Captan is particularly suited for scab control on pears, and is used in the pear spray programmes suggested. Both cultural and spray measures should be used in controlling apple mildew. Spray programmes for S-tolerant and S-shy varieties are given, and also for orchards where captan is to be used.—Murphy Chem. Co.

2638. Beraha, L., Wilson, R. A., and Dunegan, J. C.
A comparison of different fungicides for the control of apple powdery mildew in 1954.
Plant Dis. Reptr, 1955, **39**: 132-3, illus.
Miller, P. R.
A comparison of fungicides for control of apple powdery mildew.
Agric. Chemls, 1955, **10** (4): 59, 109.

In experiments on the control of powdery mildew (*Podosphaera leucotricha*) on Rome Beauty in 1954 0·75% karathane applied 4 times between 13 April (6 days before pink bud) and 13 May gave the best results and was comparable with wettable sulphur which is not now used on account of its deleterious effect. The next best was Vancide F995W.—Hort. Crops Res. Branch, U.S. Dep. Agric., Beltsville, Maryland.

2639. Sprague, R.
A re-study of apple powdery mildew in eastern Washington.
Bull. Wash. St. agric. Exp. Stats **560,** 1955, pp. 36, bibl. 28.
Summary of six years' study on apple powdery mildew.
Proc. Wash. St. hort. Ass. 1954, pp. 26-7, bibl. 15.

Studies were made on the seasonal progress and control of the disease. Karathane and/or sulphur spray schedules are given for 7 varieties. Of the many chemicals tested only these proved practical.
The second paper is a summary of the first.

2640. Besemer, A. F. H., and Meyneke, C. A. R.
De bestrijding van appelmeeldauw. (**Control of apple mildew.**)
Fruitteelt, 1955, **45**: 242-6.

In 1954, field experiments were carried out in the Netherlands on the prevention of apple mildew infection using sulphur sprays. Dry periods when the temperature was above 20° C., the most favourable conditions for conidia germination, were regarded as critical times for spray applications. Six sprays were given between the end of April and the end of July, the treatments being: (1) S sprays only, (2) 1 or 2 S sprays replaced by a scab fungicide, and (3) untreated controls. The best control was obtained on those trees which had been sprayed with S at all critical periods. In July leaf infections on trees sprayed with S only averaged 13·4% and 16·4%, as against 40% on the controls. A further critical period occurred at the beginning of August, for which no sprays were given, so that shoot infection in September was relatively high. There was a tendency for greater increase of mildew between July and September in plots in which S was not the final spray. Trees which were heavily infected early in the summer gave lower yields than those with light infections at that time.

2641. Michiels, A., Questienne, H., and Semal, J.
Étude comparative de quelques fongicides contre la Moliniose. (**A comparative study of some fungicides for monilia control.**)
Parasitica, 1954, **10**: 100-9, bibl. 5.

Several fungicides were tested against brown rot on apples inoculated with *Sclerotinia fructigena*. Excellent control was obtained with captan and 2 heptadecylglyoxalidine, thiram and copper-oxychloride also inhibited the spread of the fungus significantly.—La Hulpe. [See also *H.A.*, 25: 328.]

2642. Jordović, M.
Osetlijivost plodova nekih sorata bresaka prema parazitu *Monilia* sp. (**Testing the susceptibility of some peach varieties to brown rot.** [English summary ½ p.]
Arh. poljopr. Nauk., 1954, **7** (17): 96-9, bibl. 5.

The susceptibility of immature and mature fruits of 10 peach varieties to brown rot, *Monilia* sp., was tested under both laboratory and orchard conditions. All the varieties were found to be susceptible with only small differences between varietal reactions. Of the immature fruits those of J. H. Hale, and of the mature ones those of Red Bird and Elberta were the most resistant. Susceptibility increased with advancing maturity.

2643. Angell, H. R.
Brown rot of stone fruits. II. Differences in incidence in the peach variety, Levis Cling, on different soil types.
J. Aust. Inst. agric. Sci., 1955, **21**: 30-1, bibl. 8.

Investigations showed that excess soil moisture is the main predisposing environmental factor.—C.S.I.R.O., Canberra. [Part I published *ibidem* in 1951 concerned artificial inoculation trials.]

2644. Hutton, K. E., and Leigh, D. S.
Brown rot of stone fruits in New South Wales. 1. Control investigations on coastal dessert peaches.
Agric. Gaz. N.S.W., 1955, **66**: 23-8, bibl. 2, illus.

The control of brown rot, *Sclerotinia fructicola*, has been investigated over the past 2 seasons on Shanghai seedling peaches. Thiram at 0·12%, and 0·1% captan gave equally good control, both being superior to 0·2% S and 0·1% 9,10-phenanthraquinone. Additional K fertilizer, applied as KCl, failed to reduce infection.

2645. Ogawa, J. M., and others.
Late season protective and eradicative sprays as means of controlling brown rot of peach fruit.
Plant Dis. Reptr, 1954, **38**: 869-73, bibl. 2.
Miller, P. W.
Preharvest fungicidal spray studies on fruits, trees.
Agric. Chemls, 1955, **10**: (3): 58-9, 119-21.

In recent experiments on 6 peach varieties wettable sulphur (and also captan and a carbamate) gave the fruits significant protection against brown rot (*Sclerotinia fructicola*). Of eradicants tested lime-sulphur at 2 gal. per 100 gal. water applied 38 hours after the beginning of rain, which initiated infection, prevented further development. Thus, in the event of rain during harvesting, wettable sulphur plus lime-sulphur offers a means of protection and eradication under Californian conditions.—Univ. Calif., Davis and Butte County.

2646. Alcorn, S. M., and Ark, P. A.
The antibiotic candicidin, a protectant dip against brown rot infection of peach fruit.
Plant Dis. Reptr, 1955, **39**: 210-12, bibl. 2, illus.

Of the peach fruits dipped for ½ hour in 1: 16,666 candicidin and subsequently stored at 32° F. for 3 and 21 days before inoculation, 0 and 16% respectively became infected, as compared with 22% (stored for 3 days only) for the 1: 33,333 candicidin-treated fruits. None of the fruits treated with 1: 1,000 liquid lime sulfur were protected. A 5-minute 1: 33,333 candicidin treatment was superior to liquid lime sulfur treatments when fruits were inoculated shortly after treatment and after 3 days' storage at 32° F. When stored for 3 days at room temperature after treatment and before inoculation, 25% of 1: 16,666 candicidin-treated fruits became infected (in four trials) as compared with 88% (three trials) for those treated with 1: 1,000 liquid lime sulfur. Candicidin solution (1: 16,666) stored for 1 week at room temperature was effective in protecting against brown rot (*Monilinia fructicola*) infection of fruits dipped for ½ hour and stored at 32° F. for 1 week before inoculation. Eleven of 12 fruits remained healthy when inoculated shortly after a ½-hour dip treatment in the candicidin (1: 16,666) stored for 2 weeks. [Authors' summary.]—Univ. Calif., Berkeley 4.

2647. Petersen, D. H., and Dunegan, J. C.
Factors influencing the control of peach scab in South Carolina.
Plant Dis. Reptr, 1955, **39**: 134-40, bibl. 1.

Experiments on the control of peach scab (*Cladosporium* [*Fusicladium*] *carpophilum*) were made in 1954 to investigate some possible factors in the increased incidence of the disease in South Carolina. The results and conclusions were: (1) Six sulphur sprays, at 6 lb. per 100 gal. applied from petal fall (22 March) to pre-harvest (1 June) gave excellent control (2% scab), the spray applied 5 weeks after petal fall being particularly important. If, through unfavourable circumstances, a spray cannot be applied 4–6 weeks after petal fall, satisfactory control can still be maintained by doubling the sulphur rate. (2) Lime used alone gave little control (88% scab), but lime mixtures with several chemicals other than sulphur were better, the best being lime plus lead arsenate (33% scab). (3) Neither endomycin nor pyridimethione gave satisfactory control.—Hort. Crops Res. Branch, U.S. Dep. Agric. and Clemson agric. Coll., S.C.

2648. Varney, E. H.
Protectant sprays and eradicant ground treatments for control of mummy berry of blueberry, 1954.
[*Proc.*] *23rd annu. Blueberry Open House*, N.J. agric. Exp. Stat., 1955, pp. 15-17.

Fungicidal trials in 1954 [against *Monilinia vaccinii corymbosi*] showed that 4 sprays of ferbam in April gave about 62% blight reduction. Three sprays of maneb were equally effective. Ground sprays of 2% elgetol at 500 gal. per acre at the end of March killed almost all the apothecia. Calcium cyanamide dust applied to the soil at 250 lb. per acre also gave good results when applied at the end of March, and excellent control was obtained by dusting 150 lb. per acre on 9 April. There was no indication of blueberry injury with either elgetol or cyanamide used as ground applications, but if the materials came in contact with the tops of the bushes new growth was killed or injured.

2649. Bratusj, V. N.
Pear leaf blight. [Russian.]
Sad i Ogorod, 1955, No. 3, pp. 76-7, illus.

Entomosporium maculatum causes more serious damage in the nursery than in the orchard. For control crop rotation, sanitation, weed destruction and repeated applications of either 1–2% bordeaux or a 0·5% suspension of copper oxychloride are recommended.

2650. Reynaud, J.-B., Jouve, R., and Bruno-Mignot, H.
Les recherches au sujet du dépérissement de l'abricotier. (**Investigations on apricot decline.**)
Arboric. fruit., 1955, No. 13, pp. 19-20.

An apricot decline is causing tree losses of up to 7% per annum in the middle Rhône valley. Preliminary investigations show that death is often due to *Verticillium* sp. It is recommended that apricots should not be planted with or after strawberries, tomatoes, potatoes or lucerne, that large pruning wounds, if they are unavoidable, should be disinfected and waxed, and that only healthy scions and stocks should be used.

2651. Goheen, A. C.
Fall-dug strawberry plants as symptomless carriers of the red stele disease.
Plant Dis. Reptr, 1955, **39**: 141-2, bibl. 3.

An experiment made to ascertain whether strawberry plants grown in soil contaminated with the red stele fungus, *Phytophthora fragariae*, would be free of infection if dug in the autumn before disease symptoms were apparent showed such plants to be infected.—Hort. Crops Res. Branch, U.S. Dep. Agric., Beltsville, Maryland.

2652. Darrow, G. M., Scott, D. H., and Goheen, A. C.
Relative resistance of strawberry varieties to powdery mildew at Beltsville, Maryland, 1954.
Plant Dis. Reptr, 1954, **38**: 864-6, bibl. 2, illus.

Under screenhouse conditions which seemed most favorable to severe powdery mildew (*Sphaerotheca macularis*) infection, 41 strawberry varieties were rated for infection. Eleven varieties were free of mildew and 8 others very resistant. Some others were very susceptible. Under field conditions slightly less injury was observed than in the screenhouse. [Authors' summary.]—Hort. Crops Res. Branch, U.S. Dep. Agric.

2653. Zobrist, L.
L'efficacité des fongicides organiques en viticulture. (**The efficacy of organic fungicides in viticulture.**)
Commun. sci. IIIe Congr. int. Phytopharm., 1952, Vol. II, being *Phytiatrie-Phytopharm.*, Num. spéc., 1954, pp. 682-8, bibl. 8, illus.

In tests in 1948/52 on a number of fungicides for the control of vine downy mildew (*Plasmopara viticola*), zineb plus copper carbonate (Cuprosan) and SR 406 both appeared to have distinct advantages over the copper compounds now used. They equal or surpass them in efficacy, and stimulate growth. Zineb plus copper carbonate is no more expensive and offers the possibility of cure. Results are given.

2654. Müllner, L.
Neue Mittel zur Peronosporabekämpfung im Freilandversuch. (**New chemicals for the control of downy mildew [of vine] in field trials.**) [English, French, Spanish summaries ⅓ p. each.]
Mitt. Klosterneuburg, Ser. A, 1955, **5**: 17-33, bibl. 15.

Field trials were carried out to compare the organic fungicides zineb and captan with bordeaux and a bordeaux-Cosan mixture for the control of downy mildew of vine. To avoid an outbreak of the disease late in the season the author recommends as a precautionary measure that copper sprays be substituted for the last application of captan. Data are tabulated on the effect of the treatment on leaf and grape infection, yield and quality. The organic fungicides had no phytotoxic action, while copper sprays caused scorching. Oidium incidence was too low to allow an evaluation of its control in these experiments to be made.

2655. Kundert, J.
Die Peronospora der Rebe und deren Bekämpfung im Jahre 1954. (**Downy mildew of vine and its control in 1954.**)
Schweiz. Z. Obst- u. Weinb., 1955, **64**: 101-7, illus.

Data and graphs are presented to show the relationship between weather and spread of downy mildew in untreated vines. Zineb was outstanding among the fungicides tested in that it combined effective disease control with absence of injury. The interaction of late infection and spray damage was assessed by counting the leaves present on vines on 26 October. Those treated with zineb averaged 55, as compared with zineb+copper 39, copper oxychloride 35, bordeaux 29, captan 27 and untreated 0. As little powdery mildew occurred in 1954, the effect of the fungicides on the disease could not be studied.

2656. Häussler, H.
Chemische Vorgänge bei der Einwirkung von Schwefel auf Oidium. (**Chemical processes involved in the action of sulphur on oidium.**)
Weinberg u. Keller, 1954, **1**: 290-2, bibl. 3.

The author disproved the old view that both vine leaves and the powdery mildew fungus produce hydrogen sulphide on treatment with sulphur. He showed that the gas is produced by the fungus only, and thereby indirectly confirmed Wilhelm's view [*H.A.*, 24: 3625] that it is vaporized elemental sulphur which acts on *Uncinula necator*.

2657. Fischer, H.
Zur Bekämpfung des Rotbrenners. (**Control of rougeot of vine.**)
Schweiz. Z. Obst- u. Weinb., 1955, **64**: 182-4.

Comparative trials were set out using copper and organic fungicides for the control of rougeot disease of vines [*Pseudopeziza tracheiphila*]. Four sprays of 6 products were applied between the end of May and mid-July. At the end of July, the least amount of infection was observed on the plots sprayed with bordeaux plus wettable sulphur, and with Cuprosan. Bordeaux alone was somewhat less effective. Copper oxychloride and captan were not satisfactory.—Eidgenöss. Versuchsans., Wädenswil.

2658. Wilhelm, A. F.
Gegenwärtiger Stand der Botrytisbekämpfung an Trauben. (**The present position of *Botrytis* control in grapes.**)
Weinberg u. Keller, 1954, **1**: 286-9.

Special preparations of soft soap and all wetters, stickers and fungicides tested failed to control grey mould of grapes.—Staatl. Weinbauinst., Freiburg/Brsg.

2659. Schellenberg, A.
Kulturmassnahmen zur Verminderung der Traubenfäulnis. (**Cultural measures to reduce grey mould of vine.**)
Schweiz. Z. Obst- u. Weinb., 1955, **64**: 107-12.

Methods of training are discussed which ensure ventilation around the grapes and their protection from rain by leaves.

2660. Harvey, J. M.
Decay in stored grapes reduced by field applications of fungicides.
Phytopathology, 1955, **45**: 137-40, bibl. 20.

Use of protective fungicides in the field as an adjunct to post-harvest sulfur dioxide fumigation has significantly reduced decay in stored Emperor grapes. Captan ((*N*-trichloromethylthio)-4-cyclo-hexane-1,2-dicarboximide), B-622 (2,4-dichloro-6-(*o*-chloroanilino)-*syn*-triazine) and Crag 5400 (α,α-trithiobis (*N*-dimethylthioformamide)) significantly reduced decay due to *Botrytis cinerea* in years when this organism was a major cause of grape decay. Grapes treated with tetrachloronitrobenzene had significantly more decay than untreated checks. The relatively small portion of grape decay caused by *Cladosporium herbarum* and by species of *Alternaria* and *Stemphylium* in the test plots was not affected significantly by the fungicides tested. [Author's summary.]—U.S. hort. Field Stat., Fresno, Calif.

2661. Harvey, J. M.
A method of forecasting decay in California storage grapes.
Phytopathology, 1955, **45**: 229-32, bibl. 3.

Most of the decay in stored grapes results from incipient infections not evident at harvest and not destroyed by fumigation. The percentages of incipient infections in Emperor grapes were determined following fumigation with sulphur dioxide and incubation under aseptic conditions for 10 days. The percentages of decay that developed in grapes from the same lots after storage for 2½–4 months were also determined. These percentages were found to be closely correlated. The laboratory determination could therefore be used to forecast the decay likely to develop during storage. Grapes likely to develop decay could thus be sold early. *Cladosporium herbarum* and species of *Alternaria* and *Stemphylium* were found to be the most important fungi causing decay in the early part of the harvest season, while *Botrytis cinerea* was the chief cause of decay in the late part of the harvest season after periods of high humidity or rainfall.—Agric. Mkg Serv., U.S.D.A., Fresno, Calif. [See also *H.A.*, 25: 349.]

2662. Gossard, A. C., and Kushman, L. J.
A progress report on studies of nut decay in Chinese chestnuts.
45th A.R. north. Nut Grs' Ass. 1954, Lancaster, Pa, pp. 100-106, bibl. 5.

Three tests were conducted in Mississippi to determine whether the amount and rate of bur opening and condition of the burs at harvest are related to decay of the nuts, and when and how decay organisms enter. Nuts from green, tightly closed burs, which had probably been in the burs the shortest time after maturing, had the lowest percentage of decay or diseased embryo axes. Those from dry, tightly closed burs, which had probably been in the burs for the longest time after maturity, contained the highest percentage of decay and diseased embryo axes. Much of the decay found at the end of the storage period developed from embryo axes which were diseased at harvest. For control harvesting daily or every other day and cold storing immediately is recommended. It is indicated that the organisms found to be associated with chestnut decay, including some fungi and bacteria commonly present in the air, are generally saprophytes or weak parasites which enter the nuts by way of some dead tissue or through some mechanical injury, or are carried in by puncturing insects.

2663. Urquijo Landaluze, P.
Acción de diversos anticriptogamicos sobre los hongos, *Phytophthora cinnamomi* y *P. cambivora.* (**Effect of certain fungicides on *Phytophthora cinnamomi* and *P. cambivora.***)
Commun. sci. IIIe Congr. int. Phytopharm., 1952, Vol. II, being *Phytiatrie-Phytopharm.*, Num. spéc., 1954, pp. 664-75.

Tests on a number of fungicides for the control of the ink disease (*Phytophthora* spp.) of chestnut showed that control should consist of (*a*) dusting the collar and roots with fungicide and (*b*) incorporating a fungicide with the soil round the tree. For the former treatment suitable compounds are copper carbonate, copper oxychloride, cuprous oxide, washed copper aceto-arsenite, Semesan and Ceresan. For the latter, which is still experimental, cuprous oxide, copper aceto-arsenite and Ceresan at 250 g. per tree are suitable.—Inst. nac. Invest. agron., Madrid.

Nematodes.

2664. Goheen, A. C., and McGrew, J. R.
Control of endoparasitic root nematodes in strawberry propagation stocks by hot-water treatments.
Plant Dis. Reptr, 1954, **38**: 818-26, bibl. 29.
McGrew, J. R., and Goheen, A. C.
Nematode control in strawberry planting stocks.
Down to Earth, 1955, **10** (4): 4-5, bibl. 5, illus.

To control the northern root-knot nematode, *Meloidogyne hapla*, and a meadow nematode, *Pratylenchus penetrans*, on strawberry propagating stocks in the United States, hot-water treatments were investigated. After treatments sufficient to kill the endoparasitic root nematodes, namely 7 mins. at 121° F., 3·5 mins. at 124° F., 2 mins. at 127° F. and 1 min. at 130° F., dormant Blakemore strawberry plants survived without injury. When treated in hot water at 127° F. for 120 seconds on 3 March, surface-dried, and returned to cold storage before planting on 2 April, most mother plants survived and the number of runner plants produced during the summer was not significantly different from that on untreated control plants. However, when subjected to the same treatment on 2 April and planted immediately, some mother plants died and the number of runner plants produced during the summer was significantly less than on the untreated control plants. [From authors' abstract of 1st paper.]—Hort. Crops Res. Branch, U.S. Dep. Agric., Beltsville, Maryland.

2665. Raski, D. J.
Soil fumigation for the control of nematodes on grape replants.
Plant Dis. Reptr, 1954, **38**: 811-17, bibl. 5.

Root-parasitic nematodes, chiefly *Meloidogyne incognita* var. *acrita* and *Pratylenchus vulnus*, are an important cause of decline in old vineyards and of difficulty in establishing replants in southern California. In the experiments described, effective control was only obtained when a 3-year bean rotation intervened between removal of the old crop and replanting shortly after fumigation. A year after treatment the average root-knot gall count per pint of soil was 2·0–0·4 with 20–60 gal. DD per acre and 0·7 with 9 gal. EDB, compared with 31·6 in the control.—Univ. Calif., Davis. [See also *H.A.*, 25: 1482.]

2666. Ochse, J. J., and Brewton, W. S.
Preliminary report on *Crotalaria* versus nematodes.
Proc. Fla St. hort. Soc. for 1954, pp. 218-19, bibl. 4.

Crotalaria species were planted in soil infested with *Meloidogyne* spp. and grown for 11 months. Tests showed that there were fewer nematodes in the soil round the 7 sturdiest *Crotalaria* spp. than round the less sturdy plants. Less susceptible *Crotalaria* spp. included *C. pumila*, *C. mucunata* and *C. breviflora*.

2667. Hochapfel, H.
Freilandversuche zur Bekämpfung der "Bodenmüdigkeit" bei Apfelsämlingen mit dem Chlorpikrin-Präparat "Larvacide" und Schwefelkohlenstoff. (**Field trials on the control of soil sickness in apple seedlings with the chloropicrin preparation Larvacide and with carbon disulphide.**)
Dtsch. Baumsch., 1955, **7**: 81-5, bibl. 4, illus.

Earlier experiments had shown that soil sickness in the apple nursery could not be cured by application of boron or other minor elements (*Mitt. biol. Zentralanst. Berlin-Dahlem* 74, 1952, pp. 82-6). These negative results were followed up by trials in the course of which one-year-old Graham's Jubilee seedlings were grown in soil that had been pre-treated with carbon disulphide and Larvacide at specified concentrations and dates. Both chemicals produced a marked improvement in elongation and secondary growth, but the latter preparation proved to be much more effective than the former, the average height of seedlings grown in Larvacide-treated soil (48 c.c./m² applied 11 months prior to planting) being twice that of the controls. The leaf colour of these seedlings was normal. For the time being, however, the commercial use of Larvacide in the nursery is impracticable owing to the cost of the material.—Biol. Bundesanst., Heidelberg.

2668. McBeth, C. W., and Bergeson, G. B.
1,2-dibromo-3-chloropropane. A new nematocide.
Plant Dis. Reptr, 1955, **39**: 223-5, bibl. 6.

The nematocidal effectiveness of 1,2-dibromo-3-chloropropane, previously known as Shell OS 1897, has been demonstrated in the greenhouse and field to be 8 to 16 times that of D-D and 2 to 5 times that of ethylene dibromide. Although some crops, such as onion and tobacco, are extremely sensitive to this material, certain established plants such as citrus, walnuts, peach, and fig will tolerate dosages up to 20 times the nematocidal rate without injury. [Authors' abstract.]—Shell Dev. Co., Modesto, and Univ. Calif., Berkeley.

Mites.

(*See also* 2415.)

2669. Collyer, E., and Kirby, A. H. M.
Some factors affecting the balance of phytophagous and predacious mites on apple in south-east England.
J. hort. Sci., 1955, **30**: 97-108, bibl. 17.

The effects of lime-sulphur, dispersible S, 341SC and SR406 on populations of fruit tree red spider (*Metatetranychus ulmi*), *Typhlodromus* spp. and insect predators were studied on commercial apple trees for 3 years. The density of *Typhlodromus* increased in the first year on the organic fungicide plots and remained high. On the dispersible S plots there was a lesser increase in the first year while populations remained relatively low on the lime-sulphur plots. Each spring the densities on the S plots were reduced. Insect predators were not significantly affected by the fungicides, and populations varied with those of red spider. These were high at the start of the experiment but were subsequently markedly reduced by insect predators on all plots. There was, however, a sufficient build-up on lime-sulphur plots to cause a bronzing of Worcester Pearmain leaves in the third year. It is concluded that satisfactory control of red spider could be achieved by *Typhlodromus* mites only when the ratio of pest to predator was low. A sufficiently low ratio was only attained and maintained for 2 years on the organic fungicide plots.—E. Malling Res. Stat.

2670. Strauss, E.
Bekämpfung der Roten Spinne im Obstbau. **(The control of red spider on fruit trees.)** [English, French, Spanish summaries.]
Mitt. Klosterneuburg, Ser. B, 1955, **5**: 15-24, bibl. 7, illus.

Following the hot and dry summer of 1953 the number of red spider eggs of several species deposited on fruit trees in the Vienna area was unusually high. Of the 4 acaricides tested, EPN 300 (0·6%), Geigi 338 (0·1%), systox (0·05%) and metasystox (0·1%), the last two proved particularly effective. Metasystox has the advantage that it can be applied almost up to the time of harvesting, which greatly facilitates the control of *Tetranychus urticae* after its mass migration from weed plants to fruit trees in summer.

2671. Kirby, A. H. M.
Recent developments in chemical control of the fruit tree red spider mite (*Metatetranychus ulmi* Koch) in south-east England.
Commun. sci. IIIe Congr. int. Phytopharm., 1952, Vol. II, being *Phytiatrie-Phytopharm.*, Num. spéc., 1954, pp. 463-8, bibl. 12.

In field studies in 1948/51, the only acaricides effective for use alone were parathion and EPN 300. Promising ovicides such as DPS and CPBS were not quite good enough applied alone on one occasion, but DPS plus derris or DPS plus weak parathion were very successful.

2672. Marshall, G. E.
Apple mite populations under six control programs.
J. econ. Ent., 1955, **48**: 23-4, bibl. 9.

Of 6 acaricides used in Indiana in 1953 2(*p-tert*-butylphenoxy)-1-isopropyl-2-chloroethyl sulphite applied 3 times at 1½ lb. in 100 gal., using about 12½ gal. per tree, gave the best control of *Tetranychus bimaculatus* and *Metatetranychus ulmi* on 3 apple varieties. Regular mite population counts over a long period showed that following certain treatments populations may build up at a faster rate on one variety than on another, hence such a variety needs more frequent applications.

2673. Gasser, R.
Expériences sur la lutte contre les araignées rouges avec de nouveaux acaricides. **(Tests on the control of red spiders with new acaricides.)**
Commun. sci. IIIe Congr. int. Phytopharm., 1952, Vol. II, being *Phytiatrie-Phytopharm.*, Num. spéc., 1954, pp. 357-64.

The results are given of laboratory tests on the control of *Tetranychus urticae* on beans with chlorobenzylate, ethoxynol and DMC, and of field tests on the control of *Metatetranychus ulmi* on apple with chlorobenzylate, ethoxynol, DMC, pyrazothion, pyrazoxon, diazinon, systox and OMPA.—Soc. J. R. Geigy, Bâle.

2674. Madsen, H. F., and Borden, A. D.
Pre-bloom treatments to control European red mite eggs on pears in northern California.
J. econ. Ent., 1955, **48**: 103-5, bibl. 3.
Madsen, H. F.
Early sprays for mite control.
Calif. Agric., 1955, **9** (2): 4, 15.

Of materials tested for the control of European red mite (*Metatetranychus ulmi*) eggs on pears, compound 923 applied at 1½ pints 50% in 100 gal. in 2 seasons' trials and Mitox at 2 lb. 20% in 100 gal. in 1 season's trial held the mite in check till July. Other acaricides did not give commercial control. Dormant oil and an oil-parathion combination controlled the mites till

June, but were not so effective as compound 923 and Mitox in a pre-blossom treatment. The best time to apply acaricides in a pre-blossom spray under California conditions is the cluster bud stage in combination with lime-sulphur and wettable sulphur for scab control.

2675. Lanchester, H. P.
Summer control of pear leaf blister mite.
J. econ. Ent., 1954, **47**: 1020-1.

Tests conducted in the Yakima Valley of Washington indicate that demeton (Systox) applied to young non-bearing trees or to older ones after harvest kills the mite, *Eriophyes pyri*, within the leaf and probably within the bud. Parathion and lime-sulphur killed large numbers as they tried to migrate from the leaf blisters to the buds.

2676. Collingwood, C. A.
The glasshouse red spider mite on blackcurrants.
Ann. appl. Biol., 1955, **43**: 144-7, bibl. 4.

The paper* is an account of field observations on *Tetranychus urticae* carried out mainly in the West Midlands. Systemic sprays have been more promising than contact sprays at Luddington, where two applications in the active growing period in mid-May to early June gave virtual control of the mite during the last two seasons. Summer ovicides, in particular CPBS and chlorparacide which showed no phytotoxicity, also had a lasting effect if applied in May.

2677. van den Bruel, W. E., and Derard, J.
Le problème du tarsonème du fraisier. III. Confrontation des méthodes de lutte proposées (essais 1953+1954). (**The cyclamen mite of strawberry. A discussion of the control measures recommended after the trials of 1953-1954.**) [English summary ½ p.]
Parasitica, 1954, **10**: 133-56, bibl. 9.

None of the insecticides, including systemics, tested in the trials of 1953 [*H.A.*, 23: 2856, 24: 313] and 1954 gave really satisfactory control of *Tarsonemus pallidus* in established strawberry plantations, nor was dipping the plants in insecticidal solutions prior to planting more successful. Growers will therefore have to fall back on the older methods of hot water treatment or fumigation with methyl bromide. To avoid reinfestation new plantings must be well isolated from old fields. —Gembloux.

Insects.

(*See also* 2413, 2440, 2577c, 2614, 2618, 2619, 2734a, d, i, s, t, v, 2735a, 2819.)

2678. Gösswald, K., and Kloft, W.
Untersuchungen zur Bekämpfung schädlicher Ameisen. 1. Nestbekämpfung einheimischer Ameisen mit Kontaktinsektiziden im Freiland. (**Studies on the control of injurious ants. 1. The control of nests of indigenous ants in the field with contact insecticides.**) [English summary ⅓ p.]
Z. PflKrankh., 1955, **62**: 207-19, bibl. 51, illus.

Emulsions of DDT, BHC, phosphoric acid ester and chlordane preparations gave very satisfactory results. Methods and time of application are discussed.—Univ. Würzburg.

2679. Anthon, E. W.
Evidence for green peach aphid resistance to organo-phosphorus insecticides.
J. econ. Ent., 1955, **48**: 56-7, bibl. 3.

Results of preliminary tests in north-central Washington indicate that systox or nicotine will give commercial control of *Myzus persicae* resistant to parathion and other organo-phosphorus insecticides.

2680. Grob, H.
Expériences sur la lutte contre les aphides avec de nouvelles substances à base d'uréthane et d'esters phosphoriques. (**Tests on the control of aphids with new urethane and phosphoric ester insecticides.**)
Commun. sci. IIIe Congr. int. Phytopharm., 1952, Vol. II, being *Phytiatrie-Phytopharm.*, Num. spéc., 1954, pp. 389-96.

The results are given of tests on the control of a number of aphid species with isolan, pyrazothion, diazinon, pyrazoxon and OMPA.—Soc. J. R. Geigy, Bâle.

2681. Stafford, E. M., and Kido, H.
Control of the grape mealybug in California.
J. econ. Ent., 1955, **48**: 101-2, bibl. 3.

In 1954 experiments in California dormant sprays of emulsifiable parathion with an unknown solvent applied at 1 pint per 100 gal. gave the best control of the mealy bug, *Pseudococcus maritimus*. In a heavily infested vineyard of mature Alicante grapes the spray applied on 8–9 February at 1·6 gal. per vine produced 92% clean bunches as against 6·6% clean bunches on the controls. On mature White Malaga grapes ½ gal. of sodium arsenite, containing 3 lb. of As_2O_3, added to the parathion spray applied at 1·2 gal. per vine resulted in 95·4% clean bunches and at the same time protection was provided against black measles. Satisfactory mealybug control was also obtained in the summer by well-timed applications of 2% parathion dust at 35 lb. per acre.

2682. Schuhmann, G.
Die Einwirkung des Diäthyl-p-nitrophenyl-Esters der Thiophosphorsäure auf die San José-Schildlaus. (**The action of the diethyl-p-nitrophenyl ester of thiophosphoric acid on San José scale.**)
Reprinted from *Z. angew. Ent.*, 1954, **36**: 284-303, bibl. 10.

The residual action of E605 forte (0·03% and 0·05%) against San José scale on apple and red currant was studied in the laboratory and in the field. There was no translocation of the chemical from treated to untreated parts of the bark. Applications in the autumn (28 August-19 October) killed 99·5–99·8% and 97·8–99·3% of the hibernating scale insects on red currant and apple respectively, a degree of control not usually achieved by spraying in summer. This shows that the reduced efficacy of the chemical at lower temperatures is more than compensated for by the greater susceptibility of the young insects. The last third of June and September, when the majority of the summer and autumn generations respectively have emerged, are considered to be the optimum times for treatment.—Biol. Bundesanst., Heidelberg.

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* Read before a meeting of the Ass. appl. Biol. in November, 1954.

2683. Jancke, O., and Becker, H.
Über die ovizide Wirkung verschiedener Insektengifte auf Reblauseier (*Viteus* (*Phylloxera*) *vitifolii* Shimer). **(The ovicidal action of various insect poisons on phylloxera eggs.)** [English summary ½ p.]
Z. PflKrankh., 1955, **62**: 61-7, bibl. 13.

Systox, lindane and nicotine preparations were shown to be highly toxic to phylloxera eggs if applied at high concentrations. The results promise new developments in the disinfection of shoes, implements and materials in the vineyard.—Landes-Lehr- u. Forschungsanst. f. Wein- u. Gartenbau, Neustadt/Weinstrasse.

2684. Chaboussou, F., and Ramadier, P.
Résultats de nouveaux essais de traitements d'hiver contre la cochenille rouge du poirier (*Epidiaspis leperii* Sign.). **(The results of further experiments on the control of pear red scale, *Epidiaspis leperii*.)**
Arboric. fruit., 1955, No. 13, pp. 10-13, bibl. 8, illus.

Oleoparathion was more effective than yellow oil plus DNOC in tests against pear red scale (*Epidiaspis leperii*) made on apple and plum in 1953 and 1954. The results are given in detail. The principal conclusions drawn from the whole series of tests in 1951/54 are: (1) With yellow oil plus DNOC the emulsion is better than the miscible preparation, especially in the case of scales under 3 shells, and 5–6% is a suitable concentration for 75% oil plus 5% DNOC; (2) oleoparathion is better than oil plus DNOC and the minimum effective treatment is 80% oil plus 1·5% parathion at 2·5% concentration; (3) the scale is most resistant on pear, intermediate on apple and least resistant on plum; (4) at the correct rates one application is virtually as effective as 2 at an interval of ½ hour; (5) motor spraying at 20 kg. pressure is more effective than knapsack spraying at 6 kg.—Stat. Zool. agric. Sud-ouest, Pont-de-la-Maye.

2685. Mitrofanov, P. I.
Control of pear psylla. [Russian.]
Sad i Ogorod, 1955, No. 2, p. 80.

Of insecticides tested octamethyl [pyrophosphoramide] sprayed at 0·3% or applied to the soil at 0·1–0·15% gave the best control of pear psylla [*Psylla pyricola*] on Kieffer pears.

2686. Meljničuk, A. S.
Control of cockchafer grubs in fruit tree nurseries. [Russian.]
Sad i Ogorod, 1955, No. 3, pp. 71-2.

BHC as a 12% dust was applied in 6 nurseries on different soil types at 100, 200 and 300 kg. per ha. On light soil 100, on medium 200 and on heavy 300 kg. rates gave the best control of the grubs without affecting plant growth. The heavier rates on the lighter soils proved phytotoxic. Of methods of treatment tried, broadcast application in the spring before planting, ploughed in to a depth of 15–20 cm., was the most satisfactory. The effectiveness of BHC was reduced if it was applied with or soon after dung and, where both types of treatment are to be carried out, the insecticide should be used at a 50% higher rate than is recommended above. Mineral fertilizers did not affect the toxicity of BHC.

2687. Viel, G.
Étude sur la toxicité de divers produits insecticides pour le hanneton commun, *Melolontha melolontha* L. **(Study on the toxicity of certain insecticidal products for the cockchafer, *Melolontha melolontha* L.)**
Commun. sci. IIIe Congr. int. Phytopharm., 1952, Vol. II, being *Phytiatrie-Phytopharm.*, Num. spéc., 1954, pp. 527-9, bibl. 1.

BHC was the most effective insecticide tested. In one test, a 10% dust deposited on foliage at 0·12 mg. per sq. cm. gave 100% mortality.—Lab. Phytopharm., Versailles.

2688. Fluke, C. L., and Dever, D. A.
Soil application of insecticides to control plum curculio.
J. econ. Ent., 1954, **47**: 1115-17, bibl. 11.

Soil applications of aldrin, dieldrin and heptachlor at 3 and 6 lb. per acre appeared to be effective in lowering the percentage of curculio infestation in a heavily sodded sour cherry orchard with a previous history of high infestation. For apple maggot control similar treatments were found unsuitable.—Univ. Wisc., Madison.

2689. Eden, W. G.
Control of strawberry weevil in blackberries.
J. econ. Ent., 1954, **47**: 1150-1, bibl. 3.

An experiment was conducted for 3 years in Alabama on control of the strawberry weevil, *Anthonomus signatus* Say, on blackberries with wettable powder sprays of toxaphene, DDT, and chlordane. The use of all three insecticides resulted in significant increases in yields of marketable berries. Toxaphene was significantly better than DDT, and DDT was significantly better than chlordane. [Author's summary.]

2690. Pape, E. W.
The control of the hickory weevil (*Curculio caryae*).
44th A.R. north. Nut Grs' Ass. 1953, Rochester, N.Y., pp. 39-42.

The hickory weevil is identical with the pecan weevil of the south. In Georgia it was controlled by 2 applications of DDT 50% w.p. at 6 lb. per 100 gal. Another method suggested for its control is to apply dieldrin to the soil either as a spray or in granule form.

2691. Pape, E. W.
Preliminary Report. The control of the hickory weevil (*Curculio caryae*).
45th A.R. north. Nut Grs' Ass. 1954, Lancaster, Pa, pp. 30-1.

Dieldrin at 2 lb. per acre in 200 gal. applied to the ground under hickory trees on 1 May showed good promise against the weevil.

2692. Dalmeyer, W. H. M.
Results obtained with aldrin and dieldrin against the Mediterranean fruit fly (*Ceratitis capitata* Wied) in peach orchards in France.
Commun. sci. IIIe Congr. int. Phytopharm., 1952, Vol. II, being *Phytiatrie-Phytopharm.*, Num. spéc., 1954, pp. 267-74.

An account is given of investigations near Perpignan in 1951. It is concluded that spraying with 0·25% dieldrin about 3 weeks before harvest gives useful protection against fruit fly larvae.—Koninklijke/Shell-Lab., Amsterdam.

2693. Baresi, F., and Santocchia, A.
Nuovi mezzi di lotta contro la *Ceratitis capitata* Wied. **(New method of control of *Ceratitis capitata*.)**
Riv. Ortoflorofruttic. ital., 1955, **39**: 44-8, bibl. 7.

A mixture of 0·2% DDT and 0·05% parathion was tested on 3- and 5-year-old peach trees of 5 varieties including Elberta in 3 localities near Sanremo. Very good control of *Ceratitis capitata* (1–5% infestation compared with 45–70% in the controls) was obtained with 3 fortnightly 0·5% sprays at the rate of 2·5–4·0 l. per tree, the last being applied not more than 3 weeks before harvesting. Owing to the toxicity of the products a fortnight should elapse between the last treatment and harvesting.—Osserv. fitopat., Sanremo.

2694. Pitcher, R. S.
Observations on the raspberry cane midge (*Thomasiniana theobaldi* Barnes). III. Control.
J. hort. Sci., 1955, **30**: 73-85, bibl. 14.

In laboratory and insectary trials DDT, BHC and parathion, in the form of a spray deposit on the canes, did not prevent active midges from laying large numbers of eggs. Throughout spring and summer parathion at 0·05–0·005% gave a very high kill of eggs and larvae by means of local penetration of the outer cortical tissues of the cane. BHC at 0·02–0·005% gamma isomer showed this effect to a lesser degree in May-June only. In field trials soil treatments of 4% and 8% tar oil at about 900 gal./acre and naphthalene at 5·4 and 10·8 cwt./acre failed to give adequate control. DDT wettable powder at 0·1% was effective only if the soil also was sprayed. Two applications of BHC at 0·1% crude active ingredient in a wettable powder formulation gave good results in all 4 trials in which it was used and can be recommended as an efficient control measure. In one trial this treatment did not differ significantly from 1 application of wettable powder, but in another it was superior to 2 applications of a BHC emulsion of the same strength. 5% dusts of BHC and DDT were slightly less effective than wettable powders. Parathion gave variable results. [From author's summary.]—E. Malling Res. Stat.

2695. Fjelddalen, J.
Jordbaermjøllus *Aleyrodes fragariae* Walk. **(The strawberry whitefly.)**
Frukt og Baer, 1955, **8**: 17-21, bibl. 11, illus.

Infestations of strawberry, black currant and honeysuckle with *Aleyrodes fragariae* have been observed in southern Norway since 1952, the resulting plant injury being particularly noticeable in small strawberry fields in a sheltered position. Two applications of DDT emulsion or parathion are recommended for control and they should be extended to adjacent honeysuckle plants.

2696. Gambrell, F. L.
Biology, distribution and control of the walnut husk maggot.
44th A.R. north. Nut Grs' Ass. 1953, Rochester, N.Y., pp. 98-104.

In New York, the walnut husk maggot (*Rhagoletis* sp.) can be effectively controlled by 3 lb. of lead arsenate in 100 gal. with or without a fungicide, usually 2 gal. of lime-sulphur. No information is given on the newer insecticides.

2697. Zech, E.
Die Flugzeiten des Apfelwicklers im Jahre 1954 und der Flugverlauf während der Abende und Nächte. **(The time of codling moth emergence in 1954 and the flight activity during the evening and night.)**
NachrBl. dtsch. PflSchDienst, Berlin, 1955, **9**: 29-33, bibl. 5, illus.

About 2,400 moths were caught in two ultra-violet light traps, 1·50 m. and 12 m. above ground level, between 23 May and 12 September, 1954. Emergence of the first generation reached its peak 19–21 June, when the night temperature did not drop below 16·3° C., and that of the second generation in the first week in August. Irrespective of season the moths began to fly one hour after sunset and the nightly peak occurred during the following 1–2 hours. A higher percentage of female moths (29·1%) was caught in the 12 m.-high trap. The relation of flight to weather conditions is also discussed in some detail.—Inst. f. Phytopath., Naumburg (Saale).

2698. Ortega, J. C.
Codling moth control sprays.
Calif. Agric., 1955, **9** (5): 6, 14.

Among materials tested as alternatives to DDT for the control of codling moth on walnuts, chlorthion, which is non-toxic to man, was not very effective against codling moth but, at 6 lb. actual/acre, it gave good control of European red mite [*Metatetranychus ulmi*] and walnut aphid [*Chromaphis juglandicola*], while diazinon at 3 lb. actual/acre gave good control of all three pests.

2699. Alfaro, A.
Ensayos de lucha química contra *Cydia pomonella* L. **(Experiments on the chemical control of *Cydia pomonella*.)**
Commun. sci. IIIe Congr. int. Phytopharm., 1952, Vol. II, being *Phytiatrie-Phytopharm.*, Num. spéc., 1954, pp. 198-201.

In experiments on codling moth in Zaragoza province in 1951 and 1952 the best results were given by 4 applications of 0·6% lead arsenate with or without white oil, and by 6 applications of 0·2% DDT. Lindane at 1 in 2,500 gave little protection.—Inst. nac. Invest. agron., Madrid.

2700. Glass, E. H.
Field evaluation of insecticides against codling moth.
J. econ. Ent., 1954, **47**: 1093-1101, bibl. 4.

A total of 160 treatments was evaluated against codling moth in 2 heavily infested experimental orchards from 1948 to 1953. Each year 3 applications were made against the first brood and 2 against the second. DDT at 2 lb. of 50% w.p. per 100 gal. was the standard and gave, with the exception of one year, consistently good control. In general phosphate insecticides were toxic to codling moth, but in a full season programme they were inferior to DDT for the prevention of late season infestation. DDT appears to remain the best material against codling moth and it is unlikely that any other material available at present will take its place provided resistance to it does not develop.—N.Y. St. agric. Exp. Stat., Geneva.

2701. Mauri, N.
Au sujet de l'emploi des esters phosphoriques dans la lutte contre le carpocapse. **(On the use of phosphoric esters for the control of codling moth.)**
Fruits et Prim., 1954, **24**: 387-9.

The results are given of experiments on the control of codling with phosphoric esters. The main conclusions are: (1) phosphoric esters alone cannot be recommended on account of their short residual effect; (2) they can be used instead of arsenicals when a red spider attack is expected, provided that, if the attack does occur, the initial treatment is repeated 6–8 days later or alternatively an arsenical is given 12 days later; (3) phosphoric ester treatments would require to be given every 3–4 weeks; (4) the methyl and ethyl esters are the best; (5) misting is better than spraying.

2702. Pschorn-Walcher, H., and Herting, B.
Der kleine Frostspanner als Problem der biologischen Schädlingsbekämpfung. **(Winter moth as a problem of biological control.)**
Schweiz. Z. Obst- u. Weinb., 1955, **64**: 113-16, illus.

About 30% of the winter moth (*Operophtera brumata*) larvae collected from cherry trees in western Switzerland were found to be parasitized by several species of tachina and ichneumon flies. The former were reared for despatch to Nova Scotia where the winter moth has recently become a serious pest of apple, oak and maple. —Commonw. Inst. biol. Control, Feldmeilen, Zürich.

2703. Blankwaardt, H. F. H., and others.
Ontstaan van wilgenhoutrups-aantastingen (*Cossus cossus* L.). **(The occurrence of goat moth infestations.)** [English summary ½ p.]
Meded. Inst. Toegep. biol. Onderz. Nat. **17**, 1954, pp. 7, bibl. 7.

Penetration of newly hatched larvae into the trunks of broad-leaved trees may be prevented by covering fresh wounds with tar. Attacks of older larvae leaving infested, felled trees may be avoided by burning or soaking the infested parts, or by treating the tunnels with carbon disulphide, benzene or nicotine.

2704. Marucci, P. E.
Blueberry insect control experiments in 1954.
[*Proc.*] *23rd annu. Blueberry Open House*, N.J. agric. Exp. Stat., 1955, pp. 3-6.

Cherry fruitworm [*Grapholitha packardi*] on blueberry was controlled by 2 sprays of parathion containing 0·4 lb. of actual parathion. Blueberry maggot [*Rhagoletis pomonella*] control was slightly better with malathion than with rotenone. In the first 4 days after dusting, malathion had a slightly better suppression effect on adult flies than rotenone.

2705. Heddergott, H.
Zur Biologie und Bekämpfung des Erdbeerwicklers *Acleris* (*Acalla*) *comariana* Zell. **(Biology and control of the strawberry tortrix moth.)** [English summary 9 lines.]
Z. PflKrankh., 1955, **62**: 220-35, bibl. 17.

The strawberry tortrix moth, *Acleris comariana*, has assumed economic importance in northern Germany where two generations of larvae cause considerable damage in certain localities. Thorough pre-blossom or post-harvest applications of parathion or DDT are recommended for control as well as the burning of affected leaves, the latter being a necessary supplementary measure especially for the control of the first generation. The biology of the pest and its parasites are discussed.

2706. Durand-Gasselin, L.
Essais de lutte contre *Laphygma exiguae*. **(Tests on the control of *Laphygma exiguae*.)**
Commun. sci. IIIe Congr. int. Phytopharm., 1952, Vol. II, being *Phytiatrie-Phytopharm.*, Num. spéc., 1954, pp. 344-5, bibl. 3.

Excellent control of *Laphygma exiguae* caterpillars was given by 10 and 5% DDT dusts applied a fortnight before the grape harvest. The following materials were not satisfactory: 0·75% parathion, 50% DDT wettable powder at 0·25%, 5% parathion wettable powder at 0·3%.—Soc. Littorale, Béziers.

2707. Alfaro, A.
Ensayo de insecticidas contra la piral de la vid. **(Experiment on the insecticidal control of the vine pyralid moth.)**
Commun. sci. IIIe Congr. int. Phytopharm., 1952, Vol. II, being *Phytiatrie-Phytopharm.*, Num. spéc., 1954, pp. 196-7.

In tests in Aragon in the second half of June DDT as a 0·2% aqueous suspension gave almost total mortality among the caterpillars of *Sparganothis pilleriana*, 0·6% lead arsenate gave 30% mortality and BHC (2·5–3·0% gamma isomer) at 1 and 2% concentration gave poor results.—Inst. nac. Invest. agron., Madrid.

2708. Stelter, H.
Zur Biologie der Ampferblattwespe *Ametastegia glabrata* Fall. **(On the biology of the dock sawfly.)**
NachrBl. dtsch. PflSchDienst, Berlin, 1955, **9**: 18-19, bibl. 7, illus.

Biological studies of *Ametastegia glabrata* have shown that injury to ripening apples can be avoided by controlling *Rumex* and *Polygonum* spp. in the orchard, especially in late summer. The efficacy of insecticides applied in rings round apple stems and stakes to prevent climbing larvae from reaching the fruit will be tested when the next mass infestation of the pest occurs.

2709. Becker, H., and Spiess, K.
Untersuchungen zur Wespen- und Bienenfrage im Weinbau. **(The wasp and bee problem in viticulture.)**
Weinberg u. Keller, 1954, **1**: 281-6, bibl. 5, illus.

Bees will only cause damage when birds or wasps have previously injured the skin. Wasp control during the period from mid-April to mid-June is advocated, red currant juice having proved a suitable bait.—Landes-Lehr- u. Forschungsanst. f. Wein- u. Gartenbau, Neustadt a.d. Weinstrasse.

Other pests.

(*See also* 2734g, o, r, 2735c.)

2710. Frings, H.
Controlling pest birds with sound.
Proc. nat. Shade Tree Conf. 1954, pp. 108-12.

Some experiments are described in which a recording of a starling's distress call was used to scare starlings as they came in to roost. Such treatment repeated for 3–5 nights was generally sufficient to scare the birds away for the rest of the season. Results were not so satisfactory with a mixed group of birds, as only starlings react to the distress call. Further tests are continuing, and an alarm call of seagulls has also been obtained. The author suggests that physical methods of pest control, i.e. sounds, light, radio waves and electricity, may be used more in the future.

2711. Mansfeld, K., and Bösenberg, K.
Untersuchungen zur Frage der Verwendbarkeit blaugefärbten Weizens für die Sperlingsvergiftung mit Auswertung der zweiten Grossaktion 1953/54. **(Tests on the suitability of blue-stained wheat for poisoning sparrows and an evaluation of the second large-scale campaign 1953/54.)**
NachrBl. dtsch. PflSchDienst, Berlin, 1955, **9**: 1-10, bibl. 10.

Blue-stained wheat bait was accepted even better than the green-stained grain used in the first campaign [*H.A.*, 24: 1402] and the low casualties among yellow hammers were further reduced. The total number of sparrows killed in the second poisoning campaign amounted to 455,000.

2712. Wolfe, H. R., Bartram, R. D., and Delegans, V. C.
Mice and orchard cover crops.
Proc. Wash. St. hort. Ass. 1954, pp. 156-8.

Notes are given on the control of the short-tailed orchard mouse, *Microtus montanus*, by poison bait, particularly zinc-phosphate-treated apple or carrot cubes or cracked corn, or by spraying the cover crop with toxaphene or endrin, a method which is still under investigation but which has not always been successful.

2713. Reich, H.
Möglichkeiten zur Abwehr der Wühlmausplage. **(Vole control.)**
Mitt. ObstbVersuchsringes Jork, 1955, **10**: 41-5, bibl. 8, illus.

In the marsh soil of the Alte Land with its many ditches voles are an ever recurring plague. Cutting down the grass and other cultural measures to deprive the pest of shelter are recommended. Some preferences of voles for certain apple varieties are noted, and among rootstocks quince and M. IV and IX are favoured. All trees under 5 years old should be protected by wire netting, and certain combinations of scion variety and rootstock should not be planted close to ditches.

2714. Webster, M. H.
Controlling damage by deer, rabbits, porcupine and gophers in orchards.
Proc. Wash. St. hort. Ass. 1954, pp. 28-31.

General advisory notes are given on the control of deer by fences, repellents and scaring devices, of rabbits by screens and repellents, of porcupines by shooting and poisoning, and of pocket gophers by poisoning and trapping.

2715. Chapman, C., and Phillips, M. A.
Fluoracetamide as a rodenticide.
J. Sci. Food Agric., 1955, **6**: 231-2, bibl. 5.

Fluoracetamide was shown to be effective against ship and domestic rats in field trials, and safer to handle than sodium fluoracetate.

Sprays and spray apparatus.

(*See also* 2330, 2411c, 2734b, c, e, f, h, j, n, p, q, z, 2735d.)

2716. Spindler, M.
Innertherapeutische Insektizide. **(Systemic insecticides.)** [English summary ½ p.]
Z. PflKrankh., 1955, **62**: 97-165, bibl. 214.

The development and contemporary knowledge of internal chemotherapy is reviewed in detail. The classes of chemicals discussed are selenium compounds, organic fluorine compounds, organic phosphorus compounds and urethanes.

2717. von Rümker, R.
Phosphate insecticide research.
Agric. Chemls, 1955, **10** (3): 41-3, 131-3, bibl. 13.

The mechanism of action of organic phosphoric acid esters in mammals and in insects according to the present state of knowledge is reviewed.

2718. Gertler, S. I., and Yerington, A. P.
Preliminary tests of some N-substituted formamides as insecticides and miticides.
[*Publ.*] *U.S. Dep. Agric., agric. Res. Serv.* **ARS-33-1**, 1954, pp. 9.

Data are tabulated on the effectiveness of 32 N-substituted formamides for control of two-spotted spider mite (*Tetranychus bimaculatus*), citrus red spider (*Metatetranychus citri*), armyworm (*Pseudaletia unipuncta*), bean weevil (*Acanthoscelides obtectus*), large milkweed bug (*Oncopeltus fasciatus*) and pea aphid (*Macrosiphum pisi*). In all the tests N,N-dibutylformamide and N,N-dipentylformamide gave 100% kill of 3 insects and 1 mite at 5% concentration.

2719. Marucci, P. E.
Kerosene—one-two punch for cranberry insects, weeds.
N.J. Agric., 1955, **37** (1): 10-11, illus.

Kerosene applied early in the spring at 400 to 600 gal. per acre for weed control in cranberries resulted in very good control of some of the important insects attacking the crop. In experimental plots tipworm populations were reduced by up to 76% and sparganothis fruitworm and cranberry scale by up to 100%. Additions of DDT at 6 lb. per acre and dieldrin and BHC at 4 lb. per acre significantly increased the toxicity of kerosene to cranberry tipworm.

2720. Zentmyer, G. A.
Coined names for fungicides.
Phytopathology, 1955, **45**: 109.

The names, recently approved by the Interdepartmental Committee on Pest Control, are captan, chloranil, dichlone, ferbam, glyodin, maneb, nabam, thiram, zineb and ziram.

2721. Murphy Chemical Company Ltd.
Orthocide wettable 50% captan.
[*Publ.*] *Murphy Chemical Co. Ltd.*, Wheathampstead, Herts., 2nd edition, 1955, pp. 16.

The results of extensive trials with orthocide in Great Britain and Ireland in 1954 are reported. Good control of apple scab was obtained on Cox, Worcester and Bramley after spraying with orthocide at 2½ lb./100 gal. Less russeting was observed on Cox after orthocide treatment than after sulphur sprays. Excellent control of pear scab was obtained. The percentage of strawberry botrytis present at harvest was reduced after 2 or 4 applications of orthocide dust. There were also indications that orthocide was effective in controlling hop downy mildew, late blight on outdoor tomatoes and botrytis on lettuce. Costs of spraying with orthocide are given and compared with those of S and Hg programmes. [See also *H.A.*, 25: 1538.]

2722. Emery, G. A.
Experience with new mercurial fungicides.
Commun. sci. IIIe Congr. int. Phytopharm., 1952, Vol. II, being *Phytiatrie-Phytopharm.*, Num. spéc., 1954, pp. 561-7, bibl. 1.

Preliminary trials on 3 compounds are reported. The phenyl mercury salt of dinaphthyl methane disulphonic acid ("phenyl mercury fixtan") and Compound 618, a phenyl mercuric complex of quinolinol, both gave promising results against apple scab. Compound 580, the phenyl mercuric salt of acetyl naphthenic acid, gave control of tea blister blight equivalent to copper ammonium carbonate and better than bordeaux mixture or yellow copper oxide.

2723. Cutright, C. R.
All-purpose spray.
Amer. Fruit Gr, 1955, **75** (2): 46-7.

Amateur fruit growers can now use a mixture of methoxychlor, malathion, and captan or ferbam for spraying peaches, plums, cherries, pears, quince, red raspberries, blackberries and grapes. Four to five applications of this mixture per year should be sufficient to produce fruit relatively free from insect and disease attack. It is recommended that the first spray be applied at petal fall of sour cherry or late-flowering peaches, the second 10 days later and the remaining 2 or 3 at fortnightly intervals.—Ohio agric. Exp. Stat.

2724. (McLeod, I.)
"Archway" spraying cuts the costs.
Comm. Gr, 1955, No. 3091, pp. 680-1, illus.

A new automatic spray boom attached to a standard pump has reduced labour costs for spraying soft fruit bushes. The boom forms a complete double arch over 2 lines of bushes, and each arch has 7 jets which are so placed that the bush is in the centre of turbulence.

Spray residues and effects.

(*See also* 2408.)

2725. Mitchell, A. E., Chandler, W. A., and Hogsett, J. N.
Ferric sulfate as a means of preventing arsenical injury to apple foliage.
Quart. Bull. Mich. agric. Exp. Stat., 1955, **37**: 354-62, bibl. 9.
Iron (ferric) sulfate as a preventative of arsenical injury.
From abstr. in *Phytopathology*, 1955, **45**: 185.

It has been shown by field studies in Pennsylvania and Michigan that the quantity of ferric sulfate hydrate required to safeguard against arsenical injury when using glyodin (34% isopropanol solution of 2-heptadecylglyoxalidine acetate) at 1½ quarts, and lead arsenate at 2 to 3 lb., probably falls within the range of 3 to 24 oz. per 100 gal. Laboratory studies have shown that approximately 7 oz. of ferric sulfate hydrate are necessary to tie up 1½ quarts of glyodin into a ferric sulfate-(2-heptadecylglyoxalidine acetate) complex, preventing 2-heptadecylglyoxalidine acetate from reacting with arsenic acid to form 2-heptadecylglyoxalidine arsenate and acetic acid. Further study is necessary to determine whether 7 oz. of ferric sulfate hydrate per 100 gal. will be adequate to safeguard against possible arsenical injury under field conditions. [From authors' summary.]

2726. Mitchell, A. E.
How to avoid russeting.
Amer. Fruit Gr, 1955, **75** (2): 20-1, illus.

In studies on factors contributing to russeting, ferbam was compared with wettable S in applications to McIntosh, Delicious, Jonathan and Baldwin. Ferbam increased russeting on Jonathan, but caused little russeting on the other varieties. Wettable S caused little russeting on Jonathan, but more than ferbam on McIntosh, Delicious and Baldwin. There was no severe russeting on these varieties in years when the air temperature did not drop below 33° F. during the period pink bud to second cover. In a spray programme for McIntosh and Cortland, the use of dichlone, in combination with a drop in temperature to 30° F. after full bloom, caused severe russeting. Ferbam, glyodin and mercury all caused russeting on Golden Delicious regardless of weather conditions. Leaf injury from captan has resulted from its use with incompatible sprays. Arsenical injury was generally associated with the use of glyodin with lead arsenate and hydrated lime during periods of high relative humidity. The addition of ½–¾ lb. of ferric sulphate to 100 gal. spray of glyodin with lead arsenate reduced the risk of arsenical injury.—Mich. State Coll.

2727. Dalbro, S., and Nielsen, G.
Nogle sprøjtemidlers virkning på æbletræers vækst og fotosyntese. **(The effect of some spray materials on the growth and photosynthetic activity of apple trees.)** [English summary 1¼ p.]
Tidsskr. Planteavl, 1955, **58**: 657-82, bibl. 30, illus.

Young Cox's Orange trees in the greenhouse received 12 and 11 applications in 1951 and 1952 respectively of (*a*) water, (*b*) bordeaux mixture, (*c*) lime-sulphur and (*d*) a proprietary mercurial fungicide. Shoot growth was significantly depressed by (*b*) and (*c*), while all fungicides adversely affected girth, weight of shoots, increase in weight of trees, number of leaves per tree (in 1951) and total leaf area per tree (especially in 1951). The effects, but particularly those on leaf development, were more pronounced in 1951 when the trees were suffering from magnesium deficiency. Photosynthesis showed a temporary depression after bordeaux and lime-sulphur treatment. In 1952 the same materials and wettable sulphur were applied to Cox's Orange and Jonathan nursery trees. Bordeaux mixture depressed growth in both varieties and lime-sulphur in Cox's Orange. Lime-sulphur also reduced photosynthetic activity. The treatments caused no spray damage in the glasshouse, but scorching was severe in the field following applications of bordeaux. Finally, an apparatus is described for measuring leaf area photoelectrically.—Blangstedgaard Res. Stat.

2728. HAMMERSCHLAG, W.
Beobachtungen über vorzeitige Vergilbungserscheinungen an Reben. (**Observations on the phenomenon of premature discoloration in vine leaves.**)
Weinberg u. Keller, 1954, **1**: 173-6, illus.

Observations in 1951 and 1953 suggest that under certain weather conditions the application of concentrated copper sprays may cause premature discoloration of vine leaves on a serious scale.

2729. BLANC-AICARD, —.
Influence de certains antiparasitaires sur la physiologie de la vigne. (**The influence of certain fungicides on the physiology of vines.**)
Ann. agron., 1954, **5**: 725-6.

There was no significant difference in yield between vines receiving 7 applications of captan and 7 applications of bordeaux. Analyses of the juice suggest that captan tends to promote earlier maturity, whereas bordeaux delays ripening.—Antibes.

2730. SALLER, W.
Können Schädlingsbekämpfungsmittel zu Gärstörungen führen? (**Can plant-protective chemicals affect fermentation?**) [English, French and Spanish summaries 6 lines each.]
Mitt. Klosterneuburg, *Ser. A*, 1955, **5**: 33-9, bibl. 8.

Bordeaux, a bordeaux-Cosan mixture, captan and zineb, applied in the vineyard at normal concentrations, did not affect the fermentation of grape juice. In laboratory experiments it was found that captan was more toxic to yeast cells than several other fungicides tested, a concentration of 7·5 mg./l. being sufficient almost to inhibit fermentation.

2731. BRAID, P. E., AND DUSTAN, G. G.
Parathion residuals on immature peaches and the hazard in spraying and thinning operations.
J. econ. Ent., 1955, **48**: 44-6, bibl. 7.

On the basis of values obtained for initial parathion residues and subsequent rates of decomposition, following applications of 1 and 2 lb. of 15% w.p. per 100 gal., the authors suggest that the 14-day waiting period (7, if protective clothing is worn) between spraying and thinning of peaches recommended by the Canadian Department of Agriculture should be retained.

2732. VOGELSÄNGER, W.
Die Bestimmung selektiver Auswaschung von Spritzbelägen. (**Methods of determining selective leaching of spray residues.**)
NachrBl. dtsch. PflSchDienst., Braunschweig, 1955, **7**: 29-30.

Biological assays showed that in tests for the rain resistance of spray residues the possibility of selective leaching is a factor that has to be considered. In the case of one fungicide, for instance, it was found that the active substance was less resistant than the carrier.—Univ. Göttingen.

2733. CIFERRI, R., PICCO, D., AND ZANARDI, D.
Indagine sul fosforo presente in frutta trattata con OMPA. (**Investigation of phosphorus content of fruit treated with OMPA.**)
Not. Mal. Piante, 1955, No. 30, pp. 3-9, bibl. 5.

In tests on apples, pears and peaches the residue of octamethylpyrophosphoramide in fruit sprayed with Pestox 66 (66% OMPA) at 0·15% was below 3 p.p.m., the toxic level, 3 weeks after treatment.—Lab. critt. and Osserv. Mal. Piante, Pavia.

Noted.

2734.

a BAAS, J.
Die Mittelmeerfruchtfliege *Ceratitis capitata* Wied. in Mitteleuropa. (**The Mediterranean fruit fly in Central Europe.**)
Gartenbauwiss., 1955, **1** (n.s.): 340-65, bibl. 36, illus.
A review.

b BIGGS, A. I.
The spectrophotometric identification and determination of parathion.
Analyst, 1955, **80**: 279-83, bibl. 11.

c BITTNER, A.
Vorläufige Mitteilung zur Methodik der Züchtung gegen Kontaktgifte resistenter Honigbienen. (**Preliminary report on the method of breeding honey bees resistant to contact insecticides.**)
NachrBl. dtsch. PflSchDienst, Berlin, 1955, **9**: 50-2, bibl. 4, illus.

d BREAKEY, E. P., AND BRANNON, D. H.
Control of spittlebugs on strawberries.
Ext. Circ. St. Coll. Wash. Ext. Serv. **253**, 1955, pp. 3, illus.
Philaenus leucophthalmus and its control by aldrin, heptachlor or chlordane dusts.

e CAUSSIN, R.
Un nouvel appareil destiné au contrôle des têtes de jet de pulvérisation à faible et fort volumes. **(A new apparatus for testing low and high volume spray jets.)**
Parasitica, 1955, **11**: 10-15, illus.

f DARPOUX, H.
Les nouveaux fongicides dans la lutte contre certaines maladies des plantes. **(The new fungicides in the control of certain plant diseases.)**
[*Publ.*] *Centre de Perfectionnement techn., Cours Conférences*, No. 3202, 1954, pp. 20, bibl. 70.
A review on external and internal therapy.

g EUROPEAN PLANT PROTECTION ORGANISATION.
Report of the 4th international conference on muskrat control (Gembloux, September 21-22, 1954). [French and English.]
[*Publ.*] *Eur. Plant Prot. Org.* [*EPPO*], 1955, pp. 20.

h FEIS, N.
Constructie van rugnevelspuiten. **(The construction of knapsack mist sprayers.)** [English summary 9 lines.]
Meded. Dir. Tuinb., 1955, **18**: 193-6, illus.

i GEORGHIOU, G. P.
The grape berry moth.
Countryman, Nicosia, 1955, **9** (3): 15-18, illus.
Biology, symptoms, control.

j KOCH, H.
Geometrische Figuren und ihre Anwendbarkeit auf Düsen-Flüssigkeitsstrahlen bei mehrdüsigen Pflanzenschutzgeräten zwecks Wahl des richtigen Düsenabstandes zur Erzielung bestmöglicher Flüssigkeitsverteilung. **(Geometrical figures and their application to nozzle jets from spraying machines with several nozzles for the purpose of adjusting nozzle distance and obtaining optimum distribution of the liquid.)**
Mitt. biol. Zentralanst. Berlin-Dahlem **82,** 1954, pp. 38+9 tables, illus.

k KRISTENSEN, H. R.
Frugttraeviroser i Danmark. **(Virus diseases of top fruit in Denmark.)**
Reprinted from *Nord. JordbrForskn.*, 1954, **36**: 305-9.

l KRISTENSEN, H. R.
Virusangreb, der påvirker æblefrugter. **(Virus diseases affecting apple fruits.)**
Erhvervsfrugtavl., 1955, **21**: 226-9, bibl. 11, illus.

m KUNKEL, L. O.
Virus-induced abnormalities.
Reprinted from *Abnormal and Pathological Plant Growth*, being *Brookhaven Symposia in Biology* **6**, 1954, pp. 157-72, bibl. 14, illus.
Colour, teratological and lethal effects.

n COLE, L. W. L.
Endrin.
World Crops, 1955, **7**: 154-8, bibl. 17, illus.
Against pests of tobacco, sugar cane, deciduous fruit trees and cranberry.

o MCINTOSH, I. G., AND ADAMS, T. W.
Control of rats and mice.
N.Z. J. Agric., 1955, **90**: 229-36, bibl. 5, illus.

p MARTIN, H.
Guide to the chemicals used in crop protection. 2nd edition Supplement 1.
[*Publ.*] *Canada Dep. Agric. Sci. Serv.*, 1955, 28 loose leaf sheets.
See *H.A.*, 24: 3668.

q MILLIGAN, D. C., CROWE, A. D., AND TOWNSEND, G. E.
Report on concentrate mist blower sprayers.
A.R. Nova Scotia Fruit Grs' Ass. 1954, pp. 65, 67-9.
Five models observed in north-eastern United States and considered suitable for Nova Scotia.

r MINISTRY OF AGRICULTURE, LONDON.
The grey squirrel.
Adv. Leafl. Minist. Agric. Lond. **58,** revised 1954, pp. 5, illus.
Sciurus carolinensis, its habits and control.

s MINISTRY OF AGRICULTURE, LONDON.
The raspberry moth.
Adv. Leafl. Minist. Agric. Lond. **66,** amended 1954, pp. 2, illus.
Lampronia rubiella.

t MINISTRY OF AGRICULTURE, LONDON.
Currant and gooseberry aphids.
Adv. Leafl. Minist. Agric. Lond. **176,** amended 1954, pp. 5, illus.
Seven spp.

u POST, J. J.
De meteorologische zijde van het schurftonderzoek. **(The meteorological aspect of scab research.)** [English summary.]
Meded. Dir. Tuinb., 1955, **18**: 130-7.
The possibility of forecasting infection periods.

v RICHTER, G.
Die Engerlingsbekämpfung in Baumschulen mit Hexa-Mitteln. **(White grub control in nurseries with BHC preparations.)**
Dtsch. Gartenb., 1955, **55**: 104-6, illus.
Different methods of soil treatment, including injection.

w RINGUET, J., AND CINQ-MARS, L.
État des maladies dans les framboisières inspectées pour la certification. **(Diseases encountered in raspberry plantations [in Quebec] during inspection for certification.)**
A.R. Quebec Soc. Prot. Plants 1953, 1954, pp. 55-8.
Degree of infection of raspberry plantations with fungus and virus diseases in 1949-1952.

x STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Forsatte undersøgelser over aebleskurvens modningstid. Foreløbig meddelelse. (**Further studies on ascus maturity in *Venturia inaequalis*. Preliminary communication.**)
Tidsskr. Planteavl, 1955, **58**: 539-42.
See *H.A.*, 24: 3609.

y STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Betydningen af sprøjtetidspunkternes beliggenhed i forhold til infektionsperioderne ved bekaempelse af aebleskurv. (**The significance of timing sprays in relation to the period of infection for the control of apple scab.**)
Tidsskr. Planteavl, 1955, **58**: 549-52.
See *H.A.*, 24: 3610.

z STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Specialpraeparater anerkendte af Statens Forsøgsvirksomhed i Plantekultur til bekaempelse af plantesygdomme og skadedyr. Gyldig for året 1955. (**Chemicals approved by the Experimental Plant Culture Service in Denmark for the control of plant diseases and pests. Valid for 1955.**)
Nielsen & Lydiche (M. Simmelklaer), Copenhagen, 1955, pp. 37.

2735.

a STULTZ, H. T.
The influence of spray programs on the fauna of apple orchards in Nova Scotia. VIII. Natural enemies of the eye-spotted bud moth, *Spilonota ocellana* (D. & X.) (Lepidoptera: Olethreutidae).
Canad. Ent., 1955, **87**: 79-85, bibl. 15.

b WARD, J. R.
Diseases of peaches and nectarines.
Tasm. J. Agric., 1955, **26**: 52-8, illus.
Occurrence and control in Tasmania.

c WEBBER, E. R.
Control of moles.
Comm. Gr, 1955, No. 3098, p. 1111.
Poisoning and trapping.

d WEGENAAR, C.
Gebruik van rugnevelspuiten in tuinbouwgewassen. (**The use of knapsack mist sprayers in horticulture.**) [English summary 7 lines.]
Meded. Dir. Tuinb., 1955, **18**: 197-200, illus.
For fruit, tree, vegetable and bulb crops.

e WOLFE, H. R.
Transmission of the western X-disease virus by the leafhopper, *Colladonus montanus* (Van D).
Plant Dis. Reptr, 1955, **39**: 298-9, bibl. 11.
To peach from apricot and peach.

WEEDS AND WEED CONTROL.

General.

(*See also* 2371, 2796j, l, 3121, 3124, 3395.)

2736. BRITISH WEED CONTROL COUNCIL.
Proceedings of the British Weed Control Conference 1954, Harrogate, Vols. 1 and 2, pp. 550+73, total cost 30s.

Papers are included on herbicidal work in vegetable crops in Denmark and in bulb crops, on pre-emergence treatment in vegetables and on several aspects of the weed problem in peas. Otherwise there is little specifically horticultural.

2737. BRITISH WEED CONTROL COUNCIL.
Report of the Recommendations Committee, British Weed Control Council, 1954, pp. 73, included in *Proc. British Weed Control Conf. 1954*, Harrogate.

This report is divided into 3 parts. The first 2 are concerned with firm and tentative recommendations (1) for selective weed control in growing crops and (2) for the non-selective use of chemicals. The 3rd part contains information on application, the law and new herbicides. The wide range of information available in this report is clearly illustrated by 2 susceptibility tables included in Part 1. The first lists 174 agricultural weeds and indicates their susceptibility to MCPA, 2,4-D, DNC and dinoseb. Crop responses to these herbicides are duly considered. In the second table the susceptibility of 50 turf weeds to MCPA and 2,4-D is shown. The herbicidal activity of some new compounds is outlined and their formulae and physical properties are given.

2738. NATIONAL WEED COMMITTEE.
Report of the Recommendations Committee, National Weed Committee, Western section for 1955, Dep. Agric. Ottawa, Canada, 1955, pp. 19.

The recommendations contained in this report are based on information accumulated from experiments in Western Canada and are intended only as a guide for research workers. Problems dealt with include: control of 10 specified perennial and 4 annual weeds; weed classification according to response to 2,4-D and MCP; weed control in lawns; control of woody plants; weed control in 8 vegetable crops, 3 small fruits and bulbs; and soil sterilization.

2739. NATIONAL WEED COMMITTEE.
Report of the Herbicide Committee, National Weed Committee, Eastern section for 1955, Dep. Agric. Ottawa, Canada, 1955, pp. 19.

The recommendations, again intended for research workers only, are similar to those made by the Recommendations Committee, Western Section, though they are presented in a slightly different form and also contain information on new developments. Thus the use of certain herbicides is recommended against specific weeds and in specific crops, and other materials and methods of application are proposed for testing.

2740. COUPLAND, R. T., AND OTHERS.
Basic studies.
Res. Rep. nat. Weed Cttee (west. Sect.), Canada, 1954, Brandon, Man., pp. 96-112.

This section comprises 42 abstracts of studies concerning the ecology, life history, physiology and taxonomy of weeds and fundamental work on herbicides.

2741. BECK, T. V., AND OTHERS.
Broad-leaved annual and biennial weeds.
Res. Rep. nat. Weed Cttee (west. Sect.), Canada, 1954, Brandon, Man., pp. 43-51.

Thirty-four abstracts were received containing information on 23 weeds. The weeds are listed and their susceptibility to 2 formulations of 2,4-D, 3 formulations of MCP, amino triazole, 3,4-D and 4-C (4-chlorophenoxyacetic acid) is indicated.

2742. MISSISSIPPI AGRICULTURAL EXPERIMENT STATION.
Chemical weed control recommendations.
Miss. Fm Res., 1955, **18** (3): 3-7, illus.

Strawberries. Annual grasses and broadleaf weeds may be controlled by crag herbicide 1 at 3 lb. p.a. in 40 gal. before the weeds germinate. Cultivation should precede treatments, and retreatments may be made at 3– to 4–week intervals. In dry weather irrigation should follow treatment. *Cucurbits.* Limited studies suggest that pre-emergence treatment with NP (N-1-naphthyl phthalamic acid) or its sodium salt at 3 lb. p.a. in 40 gal. will give satisfactory control of annual weeds. *Snap beans.* Pre-emergence treatment with DN-BP (4,6-dinitro-o-secondary butyl phenol) or its salts at 8 lb. p.a. in 20–40 gal. gives good control of annual weeds for 3–5 weeks. When temperatures exceed 90° F. some vapour injury to the crop may occur. *Lawns.* Broadleaf weeds, such as plantain and dandelion, may be controlled by amine 2,4-D in water at ½ lb. p.a. Dallis grass in Bermuda grass lawns may be eradicated by spot-spraying with diesel fuel or a naphtha-type oil or by covering the area with a clear plastic for a week during hot weather. The winter weeds, henbit and chickweed, may be controlled by a water spray of DN-BP at 2 lb. active ingredient p.a. in 40 gal. when the temperature is above 60° F. *Specific weeds. Nutgrass.* Fumigation with methyl bromide at 1 lb. per 100 sq. ft. under a gas-proof cover for 48 hours. The soil should be warm and wet and dug to a depth of 10 in. *Johnson grass* in fence rows and ditches—apply sodium chlorate at 400–600 lb. p.a. in solid form or as a spray to which 200 lb. calcium chloride has been added. Preliminary tests show that young Johnson grass may be controlled by dalapon (sodium salt of 2,2-dichloropropionic acid) at 20–40 lb. p.a. *Wild onion.* Maleic hydrazide at 3 lb. (1 gal. MH-40) in 20 gal. water p.a. in late autumn when the shoots have emerged. *Brush control.* Ammate, sodium arsenite or 2,4,5-T applied to frill cuts or stumps; foliage sprays of ammate or 2,4,5-T in water; basal sprays of 2,4,5-T in oil; ammate applied in notches cut at the base of the trunk.

2743. FREEMAN, J. A., AND OTHERS.
Horticultural crops and sugar beets.
Res. Rep. nat. Weed Cttee (west. Sect.), Canada, 1954, Brandon, Man., pp. 82-90.

Of 18 abstracts submitted for this section 12 deal with weed control in horticultural crops excluding potatoes. Greater stress on pre-emergence applications and the replacement of 2,4-D by more selective herbicides are among the new trends noted. CMU applied pre- and post-emergence, i.e. autumn and spring, gave very satisfactory weed control in bulbs without causing apparent crop injury. In a young apple orchard CIPC in diesel oil gave the best control of both grasses and broad-leaved weeds, but appeared to injure the trees. Results of herbicidal applications, mainly pre-emergence, in various vegetable crops are also given.

Particular weeds.

(*See also* 2796c, h, k.)

2744. WILHELM, S.
Deleterious effects of drying on survival of broomrape seed in soil.
Plant Dis. Reptr, 1954, **38**: 890-2, bibl. 9, illus.

The number of broomrape (*Orobanche racemosa*) shoots appearing per contaminated soil sample after the planting of tomato seedlings as indicators was 69 in undried soil, 3 in soil dried 3 months and none in soil dried 6 months.—Univ. Calif., Berkeley.

2745. BROWN, D. A., AND OTHERS.
Canada thistle.
Res. Rep. nat. Weed Cttee (west. Sect.), Canada, 1954, Brandon, Man., pp. 7-8.

Four abstracts were submitted on Canada thistle (*Cirsium arvense*) control. Applications of 2,4-D+2,4,5-T followed by sodium chlorate gave complete kill. High rates of soil sterilants alone gave complete control, amino triazole fair control.

2746. GRANSTROM, B.
Chemical control of *Cirsium arvense* Scop.
Ann. roy. agric. Coll. Sweden, 1954, **21**: 281-5, bibl. 2.

Best results were obtained with salts of 2,4-D applied immediately before flowering when the carbohydrate content of the plants is at its lowest.

2747. BREAKEY, W. J., AND OTHERS.
Field bindweed.
Res. Rep. nat. Weed Cttee (west. Sect.), Canada, 1954, Brandon, Man., pp. 21-3.

Only 2 abstracts were received on bindweed (*Convolvulus arvensis*) control. Sodium chlorate followed by 2,4-D+2,4,5-T, 2,4-D and MCP were all effective under certain conditions. Methyl bromide fumigation gave complete control.

2748. SEXSMITH, J. J., AND OTHERS.
Hoary cress.
Res. Rep. nat. Weed Cttee (west. Sect.), Canada, 1954, Brandon, Man., pp. 18-20.

The 4 abstracts received contain information on hoary cress (*Cardaria draba*) control with sodium chlorate, sodium borate, borate-chlorate, 2,4-D, CMU and amino triazole.

2749. PLANT, W.
Hormones kill horsetail.
Search, reprinted in *J. Pk Adm.*, 1955, **19**: 463, 465.

Trials in Somerset have shown that marsh horsetail (*Equisetum palustre*) can be eradicated by a single weak, low-volume spray of MCPA. A concentration of 2½ pints MCPA in 10–15 gal. water per acre, applied to barren shoots of horsetail in pasture, killed the shoots within 5–6 days and no regrowth occurred. A higher concentration, 6 pints MCPA, killed the barren shoots within 24 hours but regrowth occurred within 3–4 weeks, probably because the shoots were killed too quickly for the growth substance to be transported to the roots. The addition of oil to the spray did not increase its effectiveness. MCPA dusts also killed the shoots but did not eradicate the plants. It is claimed, however, that the annual use of dusts will gradually exhaust the root system and after 3 years the weed will almost disappear. The herbicide should be applied when the barren shoots are long enough for a fairly large area to be exposed to the spray.

2750. Craig, H. A., and others.
Leafy spurge.
Res. Rep. nat. Weed Cttee (*west. Sect.*), *Canada, 1954*, Brandon, Man., pp. 9-11.

In 5 of the 6 abstracts submitted borax compounds alone or in combination with 2,4-D were used successfully against leafy spurge (*Euphorbia esula*).

2751. Friesen, H. A., and others.
Toadflax.
Res. Rep. nat. Weed Cttee (*west. Sect.*), *Canada, 1954*, Brandon, Man., pp. 12-17.

Twelve abstracts were submitted on toadflax (*Linaria vulgaris*) control by chemical and/or cultural means.

2752. Carder, A. C., and others.
Quack or couch grass.
Res. Rep. nat. Weed Cttee (*west. Sect.*), *Canada, 1954*, Brandon, Man., pp. 1-6.

A summary of 13 abstracts shows that of 13 herbicides applied for couch grass (*Agropyron repens*) control CMU, dalapon and TCA were the most frequently used, but they gave variable results. Methyl bromide at 1 lb. per 125 sq. ft. under a gas-proof cover for 24 hours gave complete kill.

2753. Leggett, H. W., and others.
Wild oats.
Res. Rep. nat. Weed Cttee (*west. Sect.*), *Canada, 1954*, Brandon, Man., pp. 24-34.

Of the 21 abstracts received on wild oat (*Avena fatua*) control, 8 deal with cultural and 13 with chemical methods. Most of the projects dealing with chemicals relate to the use of temporary soil sterilants which appears most suitable for control in field crops. Pre- and post-emergence applications in peas gave inconsistent results with much crop damage.

Control of aquatic weeds.

(*See also* 2796d.)

2754. Stephens, J. C., Craig, A. L., and Seale, C. C.
Blended solvents for control of the submersed water weed naiad in South Florida.
Weeds, N. York, 1954, **3**: 160-70, bibl. 6, illus.

The southern naiad, *Najas guadalupensis*, can be economically controlled in farm ditches by the underwater application of several emulsifiable oils. Low cost solvents, oils and gasolines can be blended with a cheap grade of heavy, mixed chlorinated benzenes and suitable emulsifiers to yield potent aquatic herbicides with specific gravities that can be varied according to requirements. Compressed inactive gases, such as CO_2 and N, can supply propelling power for spray application of the low flash point herbicides. Preliminary tests indicate that there is little danger to crop plants, which included beans and tomatoes, or to animals watered from effectively treated sources.

2755. Mune, T. L., and Parham, J. W.
Weed control. Mint weed—*Timoci ni vavalagi* (*Hyptis pectinata* (L.) Poit.). Water hyacinth—*Bekabekairaga* (*Eichhornia crassipes* Solms.).
Agric. J. Dep. Agric. Fiji, 1954, **25**: 80-3, bibl. 4, illus.

Control of *Hyptis pectinata* with 2,4-D, 2,4,5-T or MCPA and of *Eichhornia crassipes* with 2,4-D.

2756. Grigsby, B. H., Reimer, C. A., and Cutler, W. A.
Observations on the control of cattail, *Typha* spp., by chemical sprays.
Quart. Bull. Mich. agric. Exp. Stat., 1955, **37**: 400-6, illus.

An application of 6·8 or 13·6 dalapon (2,2-dichloropropionic acid sodium salt, 68% acid equivalent) in 100 gal. water, at the rate of 200 gal. p.a., destroyed the current season's top growth of bulrushes in drainage ditches, if applied when the plants were 3–5 ft. tall and starting to flower. The rate of kill was increased and the amount of regrowth reduced when 1 lb. 2,4,5-T or silvex (propylene glycol butyl ether ester of 2,4,5-trichloropropionic acid) per 100 gal. was added to the dalapon spray. The data on regrowth suggest that repeated applications for 2 or more seasons could lead to the eradication of bulrushes.

Control of woody plants.

2757. Harding, G. F., and Eaton, G. O. P.
Some practical aspects of the control of woody growth.
Proc. British Weed Control Conf. 1954, Harrogate, pp. 535-41.

A list showing the susceptibility of 26 woody plants to a miscible oil formulation of ethyl butyl esters of 2,4-D and 2,4,5-T is given. Susceptible species were satisfactorily controlled by foliage sprays of 20 oz. 2,4-D + 10 oz. 2,4,5-T in 100 gal. of water. For plants of intermediate resistance it was necessary to double these quantities. The aqueous sprays were ineffective against resistant plants which were, however, controlled by dormant season spraying with 64 oz. 2,4-D + 32 oz. 2,4,5-T in 100 gal. of oil. A 2,4,5-T ester/oil emulsion formulation applied in water in the summer was effective against susceptible species at very low rates.

2758. Carpenter, K., and Wilson, C.
The use of 2,4-D and 2,4,5-T brush killers on railway embankments.
Proc. British Weed Control Conf. 1954, Harrogate, pp. 523-34, illus.

Experiments are described in which a formulation containing 47% w/v of 2,4-D acid equivalent and 23% w/v of 2,4,5-T acid equivalent, both butoxy ethyl esters, was used to check regrowth of cut brush on railway embankments. The mixture was very effective at 2 lb. per acre applied at both high and low volume. So far, foliar spraying between mid-May and mid-July has given the most certain and economical control of the largest number of species, though basal bark and stump treatments were also effective. Practical methods combining cutting and spraying are suggested.

2759. Melander, L. W., Lungren, E. A., and Watson, W. M.
Killing native barberry with hormone-type herbicides.
Weeds, N. York, 1954, **3**: 123-30, bibl. 12, illus.

Berberis fendleri and *B. canadensis* control with foliage and dormant sprays of various formulations of 2,4-D and 2,4,5-T.

Weed control in fruit crops.

(*See also* 2719, 2742, 2778.)

2760. Davidson, J. H., Warren, L. E., and Fisher, J. R.
Preliminary reports on the use of dalapon in fruit planting.
Down to Earth, 1955, **10** (4): 22-4, illus.

During the spring of 1953 exploratory tests were initiated in Michigan using dalapon sodium salt at 3, 5, 10, 20 and 40 lb. acid equivalent per acre on apples, pears, plums, peaches, sour cherries, grapes and raspberries infested mainly with quackgrass. Similar tests were conducted in California on oranges, grapes, peaches, plums and pears infested chiefly with Johnson and Bermuda grasses. From the results it would appear that well-established apple and pear trees with extensive root systems will tolerate limited area applications of dalapon at 20 and 40 lb. rates which are high enough to kill the grass growing under the trees in a single treatment. Young trees of the same species were much more susceptible to similar rates, as were the stone fruits in Michigan. In California plums were undamaged by effective rates, but oranges suffered slight injury. Results with grapes varied. Repeated applications of low rates of the herbicide and pre-planting treatments combined with tillage were also considered.

2761. Carlson, R. F.
Grass control in red raspberries.
Quart. Bull. Mich. agric. Exp. Stat., 1955, **37**: 349-53, bibl. 1, illus.

Autumn applications of CIPC (0-isopropyl-N-3-(chlorophenyl) carbamate) were used for 2 years on raspberry plantations at 5 and 8 lb. p.a. with no apparent injury to the plants. Quack grass, June grass and Canadian bluegrass were reduced by 68% in 1953 and by 76% in 1954. As a result of grass control fruit yields were increased by 30% in 1953 and by over 40% in 1954. It is recommended that CIPC should be used as a directional spray at the rate of 8 lb. actual CIPC p.a. in 100 gal. water, this amount covering 3 acres of raspberries in rows spaced 8 ft. apart. Dalapon (sodium salt of 2,2-dichloropropionic acid) was used in the autumn of 1 year with satisfactory results. Application at 5 lb. p.a. increased fruit yield by 35%, and at 8 lb. p.a. by 16%. No cane injury was observed.

2762. Carlson, R. F.
Use a chemical hoe for controlling weeds.
Amer. Fruit Gr, 1955, **75** (4): 52, 54-5, illus.

Recommendations are given for chemical weed control in strawberry and raspberry plantations in the northern U.S.A. In new strawberry beds SES at 3–4 lb. p.a. should be used a few days after the plants are set and before weeds emerge. It can be used later as needed except during the few weeks prior to runner production. Fruiting beds can be sprayed in early spring with 1 lb. 2,4-D p.a. if small weeds are present or with 3 lb. SES if there are no weeds. 2,4-D should be used again after fruiting. Chickweed and bluegrass can be controlled by chloro-IPC used at 2–3 lb. p.a. after 20 October. In raspberry plantations 2,4-D at 1 lb. p.a. should be used as needed during the growing season to control small weeds, or SES at 3–4 lb. as a preventive spray if no weeds are present. Quack-grass, June-grass, biennial bluegrass, chickweed and peppergrass can be controlled by chloro-IPC applied at 8 lb. p.a. in autumn. Dalapon at 5 lb. p.a. is recommended for grass control in autumn or early spring.

2763. Danielson, L. L.
Use a chemical hoe for controlling weeds.
Amer. Fruit Gr, 1955, **75** (4): 53-4, illus.

Recommendations are given for chemical weed control in strawberry and raspberry plantations in the southern U.S.A. For strawberries, a basic spray mixture, consisting of 2 lb. crag herbicide No. 1 dissolved in 50 gal. water+2 quarts chloro-IPC, is recommended for repeated use to kill germinating and seedling weeds throughout the year; it should be applied at 50 gal. p.a., and should follow clean cultivation or hand weeding. No sprays should be applied during flowering, fruiting or runner rooting. During winter, small chickweed and henbit may be killed by the use of 2 gal. sinox PE or dow premerge in 50 gal. water p.a. In raspberries chickweed and henbit may be controlled after the canes are dormant by a mixture of 2 lb. crag herbicide No. 1 in 50 gal. water+1 quart chloro-IPC, at the rate of 50 gal. p.a. This mixture can also be used in early spring before new canes emerge. Spraying should follow clean cultivation. When the canes are in active growth, sprays of 4 lb. crag herbicide No. 1 in 50 gal. water p.a. should be used after cultivation.

2764. Scott, D. H., Shaw, W. C., and Ruppenthal, R. U.
Evaluation of several chemicals for weed control in strawberry fields.
Weeds, N. York, 1954, **3**: 192-207, bibl. 20, illus.

Pre-planting treatments: For this method of weed control in strawberries 6 to 8 lb. per acre of DNBP was very satisfactory on a loam soil, suppressing weeds for 75 to 90 days. On a light sandy soil, however, the treatment was less effective. CIPC at 4 to 6 lb. gave very good weed control, but the strawberry plants were damaged in 1 of 3 experiments. *Post-planting treatments:* Seven applications of SES at 3 lb. per acre at monthly intervals did not cause crop damage and gave very good weed control. Sesin showed promise for post-planting use and may be of value for pre-planting treatments. *Winter weed control:* CIPC at 3 lb. and DNBP at 1 or 2 lb. applied in mid-February gave very satisfactory weed control without injuring the dormant plants. The number of runners produced by a specific date was found to be a sensitive indicator of the effect of herbicides on strawberries and an adequate response index to use for the evaluation of new herbicides in this crop. A combination of the 3 types of treatment resulted in very good weed control without crop damage and eliminated most of the need for hand hoeing.

2765. Forshey, C. G.
Excessive cultivation can reduce grape yields.
Down to Earth, 1955, **10** (4): 19-21, bibl. 3, illus.

Evidence is presented indicating that over-cultivation might be responsible for the relatively poor soil structure of the lower yielding vineyards in Ohio. After the winter cover crop has been worked into the soil in the spring, 3–4 discings appear adequate under most conditions. Weeds in the row are thereafter controlled with 2–3 sprays of dinitro applied at 2 pints of 55% DNOSBP (Dow General), 10 gal. of diesel oil and water to make up to 100 gal. The mixture is applied at 50–100 gal. per acre, the first treatment being made in May when the weeds reach 6–8 in. in height.

Weed control in ornamentals and nurseries.
(*See also* 2742.)

2766. Wood, J., and Limb, P. G.
The weed problem in bulb crops.
Proc. British Weed Control Conf. 1954, Harrogate, pp. 65-70, bibl. 2.

In recent trials at Kirton pre-emergence applications of sulphuric acid and DNC and PCP emulsions showed promise for weed control in bulbs.

2767. Mahlstede, J. P.
Chemical weed control in the nursery.
Amer. Nurserym., 1955, **101** (8): 11-12, 100-6, bibl. 13, illus.

A review considering the complex problem under the following headings: 1. Weed and brush control on future nursery planting sites. 2. Weed control in seed and transplant beds: (*a*) soil sterilants; (*b*) contact post-emergence herbicides; (*c*) residual pre-emergence herbicides. 3. Weed control in the nursery row. In established nursery stock applications of chloro-IPC, alanap [N-1-naphthyl phthalamic acid] and crag herbicide 1 are recommended with certain reservations.

Weed control in tropical crops.
(*See also* 2742, 2755, 3319.)

2768. Ivens, G. W.
Some trials with defoliants and arboricides in East Africa.
Proc. British Weed Control Conf. 1954, Harrogate, pp. 499-508, bibl. 7.

Aerial spraying experiments were conducted with 2,4,5-T on the defoliation of evergreen sub-riverine forest in Kenya and on *Commiphora-Combretum* savannah in Tanganyika in connexion with tsetse fly control. With both vegetation types a considerable degree of defoliation occurred which persisted for several months. Tree species differed considerably in their reaction to 2,4,5-T both in speed and extent of defoliation, and those which reacted first appeared to recover the most quickly. Data are also given on killing various woody species with ground applications of 2,4,5-T for tsetse control and pasture establishment.

2769. Robinson, J. B. D.
Recommendations for the chemical control of weeds in mulched coffee.
Mon. Bull. Coffee Bd Kenya, 1955, **20**: 88.

Five gal. Shell weedkiller Q (containing 2½ lb. PCP) should be applied in 40 or more gal. water per acre. The spray, which is most effective when weed growth is 4–6 in. above the mulch, should not touch the tree or be applied closer than 1 ft. from the trunk.

2770. Rochecouste, C.
Les désherbants chimiques. (**Chemical herbicides.**)
Rev. agric. Réunion, 1955, **55**: 24-40.

The author visited Réunion from Mauritius and makes recommendations on the control of more than 100 weeds in sugar cane plantations in the island with MCPA, 2,4-D, potassium chlorate, PCP or TCA. The botanical, Mauritius and Réunion names of the weeds are given in most cases.

2771. Py, C.
Le C.M.U. herbicide sélectif hautement efficace pour plantation d'ananas. (**CMU is an efficacious selective herbicide for pineapple plantations.**)
Fruits d'Outre Mer, 1955, **10**: 157-61, bibl. 3, illus.

Experiments at the IFAC station at Foulaya show that broad-leaved weeds, chiefly Compositae, are controlled by 2·5 kg. 80% CMU per ha. and cyperaceous and graminaceous weeds by double that amount applied in the interlines only at rates ranging from 1,000 to 1,200 l. per ha. with knapsack sprayers to 500 l. with low-pressure equipment.

2772. Chow, N.-P., and Chao, T.-T.
Studies on the application of chemical weed killers in Taiwan sugarcane fields (Part I).
[Chinese, with English summary 1¾ p.]
Rep. Taiwan Sugar Exp. Stat., 1953, No. 10, pp. 35-56, bibl. 14, illus.

Among results and conclusions reported are: (1) Fernoxone, agroxone-3, 2,4-D amine salt and a Japanese formulation of 2,4-D effectively controlled broad-leaved weeds for 10 weeks in winter/spring and for 6 in late spring and early summer; (2) 20–50 kg. TCA per ha. effectively controlled grass, especially when applied pre-emergence; (3) 2,4-D plus TCA was the most effective herbicide used, and in a pre-emergence test it gave control lasting 17 weeks in winter/spring; (4) heavy rain immediately after applying pre-emergence herbicides reduced sett germination and subsequent growth of young plants; (5) hand and chemical weeding gave 8·7 and 16·7% greater yields respectively than no weeding and there was no significant difference between them in available sugar percentage; (6) 2 properly timed applications of suitable herbicides should control most weeds in Taiwan cane fields.

2773. Loustalot, A. J., Muzik, T. J., and Cruzado, H. J.
Studies on nutgrass (*Cyperus rotundus* L.) and its control.
Bull. P.R. fed. Exp. Stat. Mayagüez **52,** 1954, pp. 30, bibl. 50, illus.

Some of the more important methods which have been used to combat nutgrass at the Federal Experiment Station and elsewhere are described. They vary from grazing to treatment with herbicides. In trials at the Experiment Station repeated treatment of shoots with 2,4-D, on fallow land, reduced but did not eradicate the tubers. 2,4-D was more effective when applied after the ground had been ploughed than when it was applied first and then mixed with the soil. Temporary control of shoots in sugar cane was achieved by spraying with 0·2% 2,4-D. Against the shoots the ester formulation was found best, but for killing the tubers the sodium or amine salts were better. Methyl bromide applied at ½ lb. per 100 sq. ft. of ploughed land covered with a gas-tight cover for 48 hours killed all nutgrass tubers to a depth of 9 inches. Planting can follow about a week after treatment and the method is well suited to small horticultural plots. Control, approaching eradication, was obtained by 2 applications of CMU at 20 lb. per acre, each preceded by ploughing [see also *H.A.*, 24: 1459]. CMU persists in the soil for several months and the land must lie fallow for a long time before crops can be planted. Pentachlorophenate at 30 lb. and TCA at over 200 lb. per acre reduced the number of tubers but did not eradicate them.

2774. Watson, A. J.
Johnson grass control with dalapon in the Mississippi Delta.
Down to Earth, 1954, **10** (3): 12-13, illus.

On fallow land dalapon applied in June at 20 lb. per acre, followed by cultivation, produced a virtually complete kill of old Johnson grass [*Sorghum halepense*] and prevented the establishment of seedlings. In areas inaccessible to tillage equipment the best results were obtained with 30–40 lb. per acre applied to rapidly growing grass in late spring or early summer before it seeded.—Dow chem. Co.

2775. Allen, H. P., and Smith, W. N.
The effects of CMU and PDU on lalang-grass (*Imperata cylindrica*) in Malaya.
Proc. British Weed Control Conf. 1954, Harrogate, pp. 509-22, bibl. 2.

CMU) (3-*p*-chlorophenyl)-1, 1-dimethylurea) and PDU (3-(phenyl)-1,1-dimethylurea) were compared with sodium TCA and a petroleum aromatic/diesel oil mixture for lalang control pior to rubber planting. CMU was effective against lalang only at uneconomically high rates (60–80 lb. per acre) and PDU was quite unsuitable. TCA gave very good control at 150 lb./acre and above, while the oil mixture even at 400 gal./acre was unsatisfactory. In one trial a TCA/diesel emulsion spray was much more effective than equivalent rates of TCA in a straight aqueous spray. There were indications that slashing the grass before treatment reduced the effectiveness of TCA but slightly increased that of CMU and PDU. Results of phytoxicity tests on rubber are discussed.

Weed control in vegetables and tobacco.

(*See also* 2742, 2743, 2794.)

2776. Roberts, H. A.
Contact pre-emergence treatments for vegetable crops.
Proc. British Weed Control Conf. 1954, Harrogate, pp. 57-64, bibl. 15.

In trials at Wellesbourne PCP in oil or oil/water emulsion applied to weed seedlings before crop emergence has given excellent results. At 2 lb. per acre the kill of 9 common annual weeds of vegetable crops was very satisfactory. When applied at the same rate to onion and lettuce plots very good weed control was again obtained with no visible injury to the onions and only temporary injury to the lettuce. [See also *H.A.*, 25: 1598.]

2777. Orth, H.
Möglichkeiten der Unkrautbekämpfung mit chemischen Mitteln im Gemüsebau. (**Chemical weed control in vegetables.**)
Reprinted from *Pflanzenschutz*, 1955, No. 2, pp. 4, illus.

A general account is given of experiments on weed control in carrots, onions and peas carried out at the Institut f. Gemüsebau u. Unkrautforschung, Neuss-Lauvenburg.

2778. Petersen, H. I.
The use of herbicides in vegetable crops in Denmark.
Proc. British Weed Control Conf. 1954, Harrogate, pp. 47-55.

Methods and materials used for weed control in asparagus, strawberry, carrot, celery, parsley and chervil, potato, Kepa onion, leek and pea.

2779. Laning, E. R., Jr.
Weed control in pole beans and sweet corn.
Market Grs' J., 1955, **84** (3): 40-1, illus.

Notes are given on the use of DNAP (an amine of 4,6-dinitro-ortho-secondary butyl-phenol) as a pre-emergence herbicide on beans. It acts as both a contact and residual herbicide, and must either be applied when the soil is moist or be followed by light irrigation. The recommended rate of application is 3 lb. active ingredient in 40–60 gal. p.a. for light soils and up to 6 lb. on heavy soils.

2780. Stainier, L.
Le désherbage sélectif des cultures de pois au moyen du dinitro-o-2-butyl-phénate ammonique. (**Selective weeding of pea crops with the ammonium salt of DNBP.**)
Commun. sci. IIIe Congr. int. Phytopharm., 1952, Vol. II, being *Phytiatrie-Phytopharm.*, Num. spéc., 1954, pp. 751-5.

In tests in 1950/52 the ammonium salt of DNBP proved to be an excellent selective herbicide for use in pea crops from mid-May to early June, when the peas are 8–14 cm. tall. The material should be applied during mild dry weather at a concentration ranging from 685 g. in 800 l. water per ha. at 24–26° C. to 890 g. in 800 l. water at 15–17° C.

2781. Spencer, L. G.
Weed control in peas and lucerne with IPC and CIPC.
Proc. British Weed Control Conf. 1954, Harrogate, pp. 151-6, bibl. 3.

In 2 trials conducted for the control of wild oat, *Avena fatua*, in peas, applications of IPC and CIPC were made at 4, 8 and 12 lb. per acre in 40 and 100 gal. In one series of experiments the chemicals were intermixed with the soil before sowing and this method on a

Fenland soil, using 12 lb. of IPC and 8 and 12 lb. of CIPC, gave good control of wild oat without causing crop damage. On a Norfolk clay the pea tolerated only 4 lb./acre of IPC and no CIPC. Surface applications immediately after drilling were ineffective.

2782. Gregory, P., Reynolds, J. D., and Proctor, J. M.
Preliminary experiments on chemical control of wild oats in peas.
Proc. British Weed Control Conf. 1954, Harrogate, pp. 177-84, bibl. 9.

Eight herbicides were applied at several rates as pre-sowing, pre-emergence and post-emergence treatments. TCA at 7½ and 15 lb. per acre applied as a pre-sowing treatment gave up to 99% control of wild oats. Maleic hydrazide as a post-emergence treatment killed some of the wild oats. No other chemical or time of application gave a marked reduction of the weed. The TCA applications were generally followed by depression of pea yields, but where dense wild oats were controlled the lower rate gave no yield decrease. The material in all cases affected pea foliage. Against broad-leaved weeds in general dinoseb was most effective, and certain species were also controlled by CMU and IPC.

2783. Proctor, J. M., Reynolds, J. D., and Gregory, P.
Observations on the control of weeds in peas following experiments carried out from 1948-1953.
Proc. British Weed Control Conf. 1954, Harrogate, pp. 157-64, bibl. 3.

Experiments have shown that dinoseb is the only suitable material for weed control in marrowfat peas. Mechanical hoeing, however, which gave equal yields and only slightly inferior weed control, was much cheaper. Where charlock infestation was heavy, MCPA in powder form or, where brown mustard was prevalent, liquid MCPA added to dinoseb was found useful. [See also *H.A.*, 24: 2617.]

2784. Reynolds, J. D., Proctor, J. M., and Gregory, P.
An investigation into the possibilities of low volume application of dinoseb for weed control in peas.
Proc. British Weed Control Conf. 1954, Harrogate, pp. 165-76, bibl. 4.

Eight experiments, involving a total of 480 plots, were carried out from 1951 to 1953 to compare low *versus* high volume application of dinoseb for the control of weeds in peas. Results showed that, while high volume is more reliable and effective, the dangers of low volume application have been overrated. There was evidence from the 1951 trial that low pressure (30 lb. p.s.i.) is safer and more effective than high pressure (100 lb. p.s.i.). Smaller yield increases associated with reduction in volume are more likely to occur at extremely low volume, i.e. 15 gal./acre. Highest yields at both high and low volume were not necessarily related to treatments producing the best weed-kill, since at higher dosages toxicity to the crop was greater. [From authors' summary.]

2785. Carpenter, K., and Soundy, M.
Investigations into the practical value of MCPB as a selective weedkiller in leguminous crops.
Proc. British Weed Control Conf. 1954, Harrogate, pp. 327-45, bibl. 7, illus.

Of a number of substituted ω (phenoxy) butyric acids tested in the greenhouse and in the field, (4-chloro-2-methylphenoxy) butyric acid (MCPB) at 1–2 lb. appeared most promising for weed control in peas. Further work on varietal response and time of application is, however, required before tentative recommendations can be made.

2786. Fox, W. B., and others.
Peas and other large-seeded legumes.
Res. Rep. nat. Weed Cttee (west. Sect.), Canada, 1954, Brandon, Man., pp. 69-72.

Five abstracts were received on weed control in peas. Ten herbicides were evaluated, of which MCP and 3,4-D appeared particularly suitable. In one trial MCP at 4 oz. per acre gave a 55% yield increase compared with the control, although it caused some delay in maturity.

2787. Haritonov, V. N., and Suk, A. V.
Control of broomrape on tobacco and *Nicotiana rustica* plantations. [Russian.]
Tabak, 1955, **16** (1): 15-16.

Orobanche is a serious parasite of tobacco in the U.S.S.R. In 1954 in the Kirgiz SSR it was observed to be attacked by the orobanche fly [*Phytomyza orobanchiae?*] and the possibilities of its biological control are now being considered.

Herbicides and apparatus.

(*See also* 2796a, b, e-g, i, 3318.)

2788. Brown, J. W., and Throne, J. A.
Species sensitivity to chemicals tested for herbicidal properties.
Weeds, N. York, 1954, **3**: 171-6, bibl. 1.

In two different tests morning-glory was the most responsive of 15 species and responded to a greater proportion of compounds which were active on other species, whether or not the compounds employed had been previously screened for activity. No species, of those tested, could be used to predict accurately the response of any other species. [Authors' summary.]—Chem. Corps biol. Lab., Camp Detrick, Frederick, Md.

2789. Stone, J. D., and Rake, D. W.
Effect of borate additives on herbicides.
Agric. Chemls, 1955, **10** (5): 36-8, 123, 125, bibl. 5, illus.

Preliminary work gave evidence of the natural ability of bacteria and fungi occurring in the soil to utilize and break down organic herbicidal compounds such as 2,4-D, and thus to limit the usefulness of the compounds. Tests were therefore undertaken to investigate the possibility of adding to these compounds an ingredient that would depress, limit or prevent the activity of micro-organisms feeding on, or decomposing them. Among additives tested sodium borates, themselves having herbicidal characteristics, were the best and were thoroughly investigated. Fungal and bacterial growth was completely inhibited on culture media treated with 2 lb. equivalent per 100 sq. ft. of a 7·5% 2,4-D/92·5% sodium borate mixture (DB-Granular). In greenhouse tests pre-emergence applications of the complex DB-Granular gave very good control of Kanota oat seedlings and showed good residual activity when 2 further plantings were made, at 30-day intervals, in the same soil. Field trials have consistently shown the efficiency of this new group of herbicidal complexes in controlling such deep-rooted perennial weeds as field bindweed (*Convolvulus arvensis*), Russian knapweed (*Centaurea picris*) and Canada thistle (*Cirsium arvense*).

2790. Wain, R. L.
Selective weed control—some new developments at Wye.
Proc. British Weed Control Conf. 1954, Harrogate, pp. 311-20, bibl. 7, illus.

Effects obtained in the glasshouse by spraying 22 crop plants and 18 weeds with 0·1% solutions of 8 substituted γ-phenoxy butyric acids are given. They show that some of the acids, especially γ-(2-methyl-4-chlorophenoxy)-butyric acid (MCPB) and γ-(2: 4-dichlorophenoxy)-butyric acid (2: 4-DB) are likely to become valuable for selective weed control, though each has a limited range. In field trials, annual nettle, *Urtica urens*, infesting celery was controlled by one application of 2: 4-DB or MCPB at 2 lb. per acre without any crop damage.—Wye College.

2791. Levi, E.
Some aspects of the toxicity of 3-(p-chlorophenyl)-1,1-dimethylurea (CMU) to plants.
Aust. J. agric. Res., 1955, **6**: 27-32, bibl. 1, illus.

The action of CMU on 2 annual and 2 perennial plants was studied. An 80% wettable powder was used, and various concentrations between 0·1% and 3% were applied to young *Phaseolus vulgaris* and *Hordeum vulgare* plants, and to 4-month-old *Sorghum halepense* and *Paspalum distichum* plants. All sprays were toxic, but the rate of kill was not rapid. In tests using soil applications only, all young bean plants were killed within 15 days. Foliar sprays, where the soil was protected, caused leaf injury to *Phaseolus* and *Sorghum*, but the plants were not killed. Plants in which treated leaves were removed 4 days after brushing with CMU flowered and fruited normally, indicating that there was no translocation of the herbicide from leaves to roots.—C.S.I.R.O., Irrig. Res. Station, Griffith, N.S.W.

2792. Balme, O. E.
Preliminary experiments on the effect of the selective weedkiller 2,4-D on the vegetation of roadside verges.
Proc. British Weed Control Conf. 1954, Harrogate, pp. 219-28.

An interesting account of the effects of 2,4-D on types of verge vegetation. On all plots sprayed there has been an increase in the ratio of grasses: broadleaved weeds. The majority of dicotyledons showed a certain degree of susceptibility to 2,4-D; species are divided into 3 classes according to their reaction to the herbicide.

2793. Wort, D. J.
Influence of 2,4-D on enzyme systems.
Weeds, N. York, 1954, **3**: 131-5, bibl. 33.

A review of the literature showing that, while there is some evidence of a direct action of 2,4-D on enzymes, most findings support the thesis that the effects of this herbicide on enzyme systems are indirect [see also *H.A.*, 23: 2990].

2794. Tibbitts, T. W., and Holm, L. G.
Accumulation and distribution of TCA in plant tissues.
Weeds, N. York, 1954, **3**: 146-51, bibl. 6.

Commercial grade TCA was applied to the soil in which the test plants were grown at the rate of 10 mg. per 3 in. pot and 12 mg. per 4 in. pot, and the presence of the herbicide in the individual organs was determined 5 days later. Snap beans, which are very sensitive to TCA, accumulated large quantities of the chemical in the terminal buds and young expanding leaves. Less TCA was found in the stems and only very little was recovered from mature leaves and roots. Peas, which are moderately tolerant, were found to contain appreciable amounts of TCA in the mature leaves but very little or no herbicide in the terminal buds, stems or roots. Beets, which are highly tolerant, and millet, very sensitive, contained similar low amounts of TCA in all the plant organs studied.

2795. Fryer, J. D., and Elliott, J. G.
Spraying equipment for the experimental application of herbicides.
Proc. British Weed Control Conf. 1954, Harrogate, pp. 375-88, bibl. 2, illus.

An illustrated description of a pneumatic type knapsack sprayer and 2 Land Rover mounted field sprayers developed by the Unit of Experimental Agronomy, Oxford.

Noted.

2796.

a Akesson, N. B.
Drift problems in the application of 2,4-D by aircraft.
Down to Earth, 1955, **10** (4): 16-18, illus.

b Christoph, R. J., and Fisk, E. L.
Responses of plants to the herbicide 3-(*p*-chlorophenyl)-1,1-dimethylurea (CMU).
Bot. Gaz., 1954, **116**: 1-14, bibl. 12, illus.

c Corns, W. G., and others.
Wild and tartary buckwheat.
Res. Rep. nat. Weed Cttee (west. Sect.), Canada, 1954, Brandon, Man., pp. 37-40.
Polygonum convolvulus and *Fagopyrum tataricum* control.

d Craig, H. A., and others.
Horsetail.
Res. Rep. nat. Weed Cttee (west. Sect.), Canada, 1954, Brandon, Man., pp. 41-2.
Equisetum arvense control.

e Currier, H. B., and Peoples, S. A.
Phytotoxicity of hydrocarbons.
Hilgardia, 1954, **23**: 155-73, bibl. 36.
Carrot and other plants used in tests.

f Erickson, L. C., and Brannaman, B. L.
Chromotropic acid method for determining 2,4-D residues in rinses.
Hilgardia, 1954, **23**: 175-84, bibl. 13.

g LEINWEBER, C. L., AND MCCULLY, W. G.
An inexpensive controlled-environment chamber for herbicide research.
Weeds, N. York, 1954, **3**: 143-5, bibl. 4, illus.

h MCDONALD, B. K.
Other perennial herbaceous weeds.
Res. Rep. nat. Weed Cttee (west. Sect.), Canada, 1954, Brandon, Man., pp. 22-3.
Weed species are grouped according to their susceptibility to 2,4-D.

i MUZIK, T. J., CRUZADO, H. J., AND LOUSTALOT, A. J.
Studies on the absorption, translocation, and action of CMU.
Bot. Gaz., 1954, **116**: 65-73, bibl. 11, illus.

j RIES, S. K., AND JACOB, W. C.
Design and analysis in chemical weed control research.
Weeds, N. York, 1954, **3**: 152-9, bibl. 12.

k SEXSMITH, J. J., AND OTHERS.
Green foxtail.
Res. Rep. nat. Weed Cttee (west. Sect.), Canada, 1954, Brandon, Man., pp. 35-6.
Setaria viridis control.

l WOODHAM, V. F.
Le controle chimique des mauvaises herbes sur les bords de routes. (**Chemical weed control on road verges.**)
Commun. sci. IIIe Congr. int. Phytopharm., 1952, Vol. II, being *Phytiatrie-Phytopharm.*, num. spéc., 1954, pp. 767-71.
2,4-D at Withybridge, Glos.

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE.

General.

(*See also* 2347, 2379, 2383, 2384, 2402, 2411g, 2412g, 2742, 2743, 2776-2786, 2992n, 2993c, e, 3069 l, 3161, 3190, 3378, 3379, 3385, 3395, 3404, 3407.)

2797. ANDERSSEN, F. G.
Horticulture. [Forming part of the Annual Report of the Secretary for Agriculture, Union of S. Africa, for the year ending 31 August, 1954.]
Fmg S. Afr., 1955, **30**: 113-15, 124.

Production research: among trials carried out at the Horticultural Research Station near Pretoria were those on tomato and bean varieties, onion spacing and sowing time, planting onion sets, irrigation of peas, effect of position in the field on carrot yield, control of gladiolus fly and gladiolus corm storage. *Breeding research:* progress has been made with the production of wilt-resistant Chinese chrysanthemums and rust-resistant snapdragons, the improvement of onion, pea and cabbage varieties, and the development of male sterile lines of tomatoes.

2798. BLANKHOLM, E., AND KLOUGART, A.
35. Beretning fra Faellesudvalget for Prøvedyrkning af Køkkenurter. (**35th Report of the Committee for Testing Vegetables.**) [English summary 2½ pp.]
Årbog Gartneri 1954, 1955, pp. 221-95, illus.

Detailed reports are given of variety trials with the following crops: early winter cabbage, early and late brussels sprouts, winter spinach and radish for forcing in heated frames. Data are also presented on the vitamin B and C contents of brussels sprouts.

2799. LUDDINGTON (N.A.A.S.).
Vegetable section.
Rep. Luddington exp. Hort. Stat. for 1953, 1954, pp. 12-23.

Reports are given of a spacing trial with asparagus and drumhead cabbage. N.I.A.B. brassica trials were continued with spring cabbage, broccoli, red cabbage, sprouts, and Dutch and Swedish cauliflowers. Observations are recorded on a trial with Canadian varieties of celery.

2800. WAHHAB, A., AND HAMI, M. A.
I. Chemical composition of non-leafy vegetables. II. Idem. Effect of stage of growth.
Punjab Fruit J., 1954, **18** (68/69): 29-32, bibl. 10; 32-4, bibl. 5.

The chemical composition of the following vegetables was determined: *Momordica charautica*, okra, egg-plant, chilli, musk melon, garlic, turnip, carrot, radish, cauliflower, kohlrabi and pea.
Analyses of fruits of the first 5 at different stages of development showed that, in general, protein, carotene, vitamin C, Ca and Fe contents are highest before maturity, total sugars and starch are highest at the normal picking time, and P and crude fibre contents increase with age.

2801. v. HÖSSLIN, R.
Ein Beitrag zur Kenntnis des Wurzelwachstums einiger Gemüsearten unter natürlichen Verhältnissen. (**A contribution to our knowledge of root growth in some vegetables under natural conditions.**)
Festschr. 25 jähr. Bestehen gärtn. Hochschulstud. Deutschland, 1954/55, pp. 47-62, bibl. 8.

Observations were made on the spread of the roots of the following vegetable crops by means of a method allowing the excavation of the complete root system *in situ*: onions (spring onions and onion sets), lettuce, celeriac, tomato, leek, kohl rabi, cucumber, spinach, carrot, beetroot, chicory, pea, parsley, cabbage. The crops are arranged in increasing order of maximum root depth, ranging from 70 cm. in spring onion to 170 cm. in cabbage. Other tabulated data include information on the lateral spread of the root system and its depth expressed as percentages of the total root mass and on the residue of roots in the soil after harvest, which ranges from 1,224 kg./hectare (air-dry) in celeriac to 173 kg./hectare in parsley. The significance of the root residue is discussed in relation to the crop following in the rotation.—Lehr- u. Forschungsanst. f. Gartenbau, Weihenstephan.

2802. Paul, P. C., Bean, M., and Carlson, R.
Consumer reasons for selection of certain produce items.
Quart. Bull. Mich. agric. Exp. Stat., 1955, **37**: 339-48, bibl. 6.

A survey is reported on the attitude of Michigan consumers in the purchase of potatoes, carrots, blanched celery, cauliflower and apples, and of their reaction towards government grades of these products.

2803. Bragdø, M.
Production of polyploids by colchicine. [Dutch summary.]
Euphytica, 1955, **4**: 76-82.

Colchicine treatment methods used at the Agricultural College in Norway are described. Tetraploids of lettuce, spinach and turnip have been produced.

2804. Harrington, J. F., and Minges, P. A.
Vegetable seed germination.
[*Mimeo. Leafl.*] *Univ. Calif. agric. Ext. Serv.*, 1954, pp. 11.

Tables are included on the percentage germination of 24 kinds of vegetable at different temperatures, number of days to emergence, effect of soil moisture, and minimum, optimum and maximum soil temperatures for germination.

2805. Wallen, V. R., Wallace, M. A., and Bell, W.
Response of aged vegetable seed to seed treatment.
Plant Dis. Reptr, 1955, **39**: 115-17, bibl. 2.

Of 23 vegetable seed stocks harvested between 1946 and 1953 and sown in 1954, 20 responded to seed treatment. Best results were given by Panogen (methyl mercury dicyan diamide 1·4% mercury equivalent) and B856C (1,3-dichloro-5,5-diphenylhydantoin) followed in descending order of merit by Phygon, Arasan, Merculine, Orthocide 75 and Vancide 51. In general, seed treatment of aged seed greatly increased germination.—Canada Dep. Agric., Ottawa.

2806. Maasch, R.
Versuche über den Einfluss bunter Tüten auf die Keimkraft gärtnerischen Saatgutes. **(Experiments on the effect of colour-printed seed packets on the germination of horticultural seed.)**
Saatgut-Wirtsch., 1955, **7**: 43-4.

Long experience and tests have shown that germination is not appreciably affected by storage of the seed in colour-printed packets. Data are tabulated for the germination of kale, parsley, carrot, lettuce and cucumber seed exposed to the action of dyes used in colour-printing. [See also *H.A.*, 24: 2633.]

2807. Nieser, O.
Saatgutlagerung. **(Seed storage.)**
Saatgut-Wirtsch., 1955, **7**: 42-3.

Some data are given on the hygroscopic properties of seed packets made from 3 types of paper. The germination of lettuce seed kept for 6 months in ordinary paper packets or open glass jars was not affected by high relative humidity (up to 83%) during the autumn. —Staatsinst. f. angew. Bot.

2808. Edeljšteĭn, V. I.
The biological principles of obtaining high quality seedlings. [Russian.]
Nacentov, D. I.
Timely and better preparation of peat-humus pots. [Russian.]
Vlasova, L. N., Vaščenko, S. F., and Faĭnberg, F. S.
Potted seedlings hasten the maturity and increase the yield of vegetables. [Russian.]
Krotova, O. A.
To raise seedlings in peat-humus pots. [Russian.]
Gazenbuš, N. K.
A trial on obtaining high quality cucumber seedlings in the glasshouse. [Russian.]
Tertyčnaja, L. A.
The effect of granulated superphosphate on the earliness and yield of tomatoes. [Russian.]
Sad i Ogorod, 1955, No. 1, pp. 10-14, 15-19, 19-24, 24-6, 27-9 and 29-31 respectively, illus.

The common feature of these 6 articles is the production of vegetable seedlings in nutrient blocks, though under different conditions. Cabbage, cauliflower, cucumber and tomato were the most frequently used plants raised in soil pots of different size, shape and composition in frames or glasshouses, in certain cases under controlled temperature and light conditions. The results obtained from the plants raised in pots, measured in earliness and yield, were invariably better than those obtained from the controls. The composition of the soil mixture for the pots depended on locally available material and on plant species, which also determined the type and amount of mineral fertilizer added to the mixture. Some specific recommendations regarding all the features studied are made.

2809. Luddington (N.A.A.S.).
Manuring and nutrition experiments.
Rep. Luddington exp. Hort. Stat. for 1953, 1954, pp. 27-34.

Fertilizer placement: 2 levels of a complete fertilizer were broadcast or placed for several vegetable crops. Beet yields showed an increase in favour of placed fertilizer; lettuce growth and yield was favourably affected by placement; yields of French beans were increased at the high rate of placed fertilizer.

2810. Sugiyama, T., and others.
Responses of vegetables to foliar applications of nitrogenous and phosphatic compounds.
From abstr. in *Rec. Res. Fac. Agric. Univ. Tokyo*, 1953/54 [issued February 1955], **IV**, No. 7, being Studies on foliar application, 1954, pp. 31-7.

Urea and ammonium nitrate, but not ammonium sulphate or sodium nitrate, were promising as foliar sprays for Komatsunas, a variety of leafy brassica. Urea sprays promoted growth in plants grown in no-N culture solution, but the weights of the plants were far less than those of unsprayed plants in complete nutrient solution. Urea and ammonium nitrate foliar sprays promoted growth in turnip but sprayed plants in low-N solution did not show such good growth as unsprayed plants in high-N solution. It was concluded from these 2 experiments that ample soil N is necessary for the vigorous growth of these vegetables even when foliar N is applied. Of the phosphatic compounds applied to the foliage of tomato seedlings grown in P-deficient soil, sodium, ammonium and potassium phosphate were the most effective, glycerophosphate and meta-phosphoric acid were less effective and orthophosphoric acid caused severe injuries.

2811. VOLK, G. M.
The value of organic nitrogen in vegetable fertilizers.
Proc. Fla St. hort. Soc. for 1954, pp. 153-7, bibl. 6.

The value of N derived from natural organic sources in vegetable fertilizers is discussed. The author concludes that natural organics are justified only to the extent that their higher cost can be borne by their value as soil conditioners. Their value of resistance to leaching is generally over-emphasized. By replacing some of the inorganic N by slowly available sources, excessive N uptake in the first 2 weeks after application is to some extent prevented.

2812. ANON.
Hydrokultur mit Kohlensäurebegasung.
(Hydroponics with the aid of CO_2 gas.)
Dtsch. GärtBörse, 1954, **54** (31): 8-9.

A report is given of experiments carried out for several years at the Kohlenstoffbiologische Forschungsstation. The application of CO_2 to glasshouse cucumbers grown in soilless culture resulted in 2½ times higher yields and in the advancement of cropping by 3 weeks, as compared with the controls grown without CO_2 either in soilless culture or in Fruhstorfer's standard potting soil [*H.A.*, 24: 620]. It was found that CO_2 liberation was particularly effective where an artificial medium failed to supply the additional CO_2 normally available from the decomposition of a rich humus soil. Some data on the CO_2 content of the air in a cucumber glasshouse are quoted and industrial sources of the gas are discussed.

2813. FRÖHLICH, H.
Pflanzenphysiologische Grundlagen der Zusatzberegnung im Feldgemüsebau. **(The plant physiological basis of sprinkler irrigation in field-grown vegetables.)**
Dtsch. Gartenb., 1955, **2**: 134-6, bibl. 3.

The periods of highest water requirements are tabulated for cauliflower, lettuce, kohl rabi, pea, carrot, tomato, bean, cucumber, cabbage, leek and celeriac. Diagrams illustrate the relationship between soil moisture and dry matter formation in carrots and celeriac and between yield and rainfall in celeriac.—Inst. f. Gartenbau Grossbeeren.

2814. GEISSLER, T.
Neue Ergebnisse von der Staubewässerung zur Gemüsepflanzenanzucht. **(On subirrigation for the raising of vegetable plants.)**
Dtsch. Gartenb., 1955, **2**: 70-3, illus.

The following methods of watering vegetable seedlings in boxes or pots were compared: (1) Subirrigation, water level just below gravel surface, (2) subirrigation, water level 2 cm. below gravel surface, (3) intermittent subirrigation (usually ½ hour per day, during which the soil in the pots and boxes took up water to saturation), (4) watering by can. The treatments were begun immediately after pricking out and were combined with artificial illumination of one portion of the plants from 10 p.m. to 8 a.m. In glasshouse cucumbers and tomatoes given light treatment at night the rate of plant development was very markedly increased by (2) as compared with (4), (1) and (3) being intermediate, in that order. Tomato seedlings for outdoor plantings pricked out 27 March also benefited most from (2)—though to a lesser degree in the absence of light treatment which was pointless in view of the advanced season; (1) had a deleterious effect, (3) and (4) being intermediate, in that order. The favourable response of cauliflower and melon seedlings to subirrigation is also briefly reported. Problems of equipment are discussed.

2815. BERNSTEIN, L., MACKENZIE, A. J., AND KRANTZ, B. A.
The interaction of salinity and planting practice on the germination of irrigated row crops.
Proc. Soil Sci. Soc. Amer., 1955, **19**: 240-3, bibl. 6.

The influence of bed shape, planting, and irrigation practice on the germination of row crops on a series of artificially salinized plots was determined at Riverside and Brawley, Calif. Three experiments were conducted, testing 4 bed types with a total of 8 crops [including lettuce, broccoli and cantaloupe]. The salinity status of the soil in the plow-layer prior to bedding-up may be used to predict the probable success of various planting practices. Flat-topped single row beds present the greatest salinity hazard since sufficient salt may accumulate around the seed during irrigation to prevent emergence even if the electrical conductivity of the saturation extract at the time of planting is only in the order of 2 or 3 millimhos. Sloping beds present the least salinity hazard because salt is effectively carried away from the seed row by the advancing wetting-front and accumulates in the top of the bed. Mulched beds and double-row flat beds (lettuce beds) are intermediate in salinity hazard in that initial salinities of about 10 millimhos may be tolerated if certain precautions are taken. [Authors' abstract.]

2816. VAN DAM, J. G. C.
Examination of soils and crops after the inundations of 1st February, 1953. II. The influence of salt on the chief vegetable crops.
Neth. J. agric. Sci., 1955, **3**: 1-14, bibl. 9.

Eleven trial fields were selected on the islands of South Holland in an investigation of the reactions of vegetables to the salt content of the soil. The C index (number of grams of NaCl per litre of soil moisture) was calculated for the 5–20 cm. soil layer, and varied from normal to 8. In fields with a high C index the following effects were observed: Before rain leaching, seed germination of leeks, spinach and carrots was poor. Seed germination of chicory was also poor where the soil structure had deteriorated; soil structure was improved by gypsum applications. The crops grew more slowly and were harvested at a later date than in normal soils. Bolting was stimulated in cabbage lettuce and spinach. Lettuce, endive and savoy cabbage showed marginal leaf scorch, and leeks showed tipburn. *Phaseolus* beans, peas and strawberries were very sensitive to even a low salt content. There were only slight differences in yields of brassicas sown *in situ* and transplanted; with leeks sowing *in situ* was inferior to transplanting. The forcing quality of chicory roots from salty soils was approximately the same as of those from normal soils. The cauliflower crop failed in the trial fields. Yields of leafy crops were better in soils with high than with low moisture contents. Brussels sprouts and red cabbage were more susceptible to attack by *Phoma lingam* in the salt trial fields than in normal soils.

2817. Luddington (N.A.A.S.).
Pathological experiments.
Rep. Luddington exp. Hort. Stat. for 1953, 1954, pp. 24-6.

Barrier crops of marrowstem kale, barley and broad beans were successful in preventing the spread of cauliflower mosaic in the seed-bed.

2818. Brown, E. B.
Occurrence of the root-knot eelworm, *Meloidogyne hapla,* out of doors in Great Britain.
Nature, 1955, **175**: 430-1, bibl. 3, illus.

In recent years severe attacks by eelworms of the genus *Meloidogyne* have occurred on outdoor horticultural crops in eastern England where glasshouses can be ruled out as a source of contamination. In contrast to the symptoms produced on glasshouse plants, the galls were very small (not more than 3–4 mm. in diameter) and the amount of root proliferation was large. Crops damaged by *Meloidogyne hapla* included carrots and scabious.—N.A.A.S., Trumpington, Cambridge.

2819. Jenkins, C. F. H.
The climbing cutworm (*Heliothis punctigera* Wallengren).
J. Agric. W. Aust., 1955, **4**: 75-6, 79-81, bibl. 2, illus.

Information is given on *Heliothis punctigera*, a pest of tomatoes, peas, beans, immature pome and stone fruits and nuts, and ornamentals, and on its control by cultural and chemical (DDT or lead arsenate) methods.

Asparagus.

(*See also* 3249.)

2820. Pastoriza, R.
Congelación rápida de espárragos. Composición química al cabo de dos anos de estacionamiento. **(Quick freezing of asparagus: chemical composition after 2 years' refrigeration.)**
Rev. Invest. agríc. B. Aires, 1953, **7**: 185-91, bibl. 12.

After 2 years' freezing the 2 types of asparagus tested retained their colour and aroma and had total sugars and proteins contents comparable with those found by other workers. After 33 months their flavour was not appreciably different from the fresh product.

Brassicas.

(*See also* 2344, 2389, 2532, 2922, 2993f, 3402.)

2821. Jensma, J. R., and Kraai, A.
Practijkproeven met spruitkool 1950-1951. **(Trials with brussels sprouts 1950-1951.)**
Meded. Inst. Vered. Tuinbouwgew. **58**, 1954, pp. 23, illus.

The chief Dutch sprout varieties are described. In the trials it was shown that the early varieties gave higher yields than the late. Of the strains recommended as a result of the trials, 2 were of the early variety Bredase, 1 was from Lierse, a fairly early variety, 7 were of the hardy variety Roodnerf, and one of the late variety Beemster.

2822. Jensma, J. R., and Kraai, A.
Practijkproeven met witte kool 1952-1953. **(Cabbage trials 1952-1953.)** [English summary $\frac{1}{3}$ p.]
Meded. Inst. Vered. Tuinbouwgew. **61,** 1955, pp. 35, illus.

Earliness and productivity of strains of 7 Dutch cabbage varieties were compared for 2 years. There was a strong correlation between these two characters, so that all yield differences could be related to differences in earliness.

2823. Jensma, J. R., and Kraai, A.
Practijkproeven met rode kool 1950-1951. **(Trials with red cabbage 1950-1951.)**
Meded. Inst. Vered. Tuinbouwgew. **57,** 1954, pp. 33, illus.

Among the early red cabbage varieties tested only Langendijker Vroege Rode could be recommended. There was considerable variation in earliness, but all the earliest strains and 2 of the middle-early strains seemed promising. The gross weight of the later strains was higher than that of the early ones. Of the autumn varieties Langendijker Herfstrode fulfilled the requirements. The 7 recommended strains of Langendijker Rode Bewaar, a storage variety, had the lowest yields, but the best storage qualities of those tested. There was considerable colour variation within this variety.

2824. Watanabe, S.
Oecological study and classification of cabbage varieties and breeding of varieties for summer use. [Japanese, with English summary $5\frac{1}{2}$ pp.]
Bull. nat. Inst. agric. Sci. Hiratsuka (*Ser. E*), 1954, **3**: 1-11, bibl. 29, illus.

As a result of studies of Japanese and foreign cabbages, varieties are recommended for spring, summer and autumn use. Shotō, Chūtō and Bantō are 3 summer varieties which have been bred since 1940.

2825. Mačis, Ju, I.
Cauliflower seed production. [Russian.]
Sad i Ogorod, 1955, No. 4, pp. 18-20, illus.

In Lithuania, cauliflower sown in February, pricked out and 12 days later transplanted into nutrient blocks, was planted in the open on 3 May at a distance of 60 × 60 cm. In the field the plants were protected from the north by rows of sunflower and from the west by maize. Towards the end of technical maturity the centres of the curds were cut out leaving 4–5 side shoots which by late August-early September, depending on variety, produced good quality seeds.

2826. Krotova, O. A.
The effect of micro-fertilizers on seedling quality and yield of cauliflower. [Russian.]
Sad i Ogorod, 1955, No. 2, pp. 25-7.

$\mathrm{Cu}+\mathrm{B}+\mathrm{Mn}$ applied to cauliflower seedlings, raised in nutrient blocks, when the first and second true leaves were developing improved the growth, disease resistance and cold resistance of the plants and increased yields. The plants receiving Cu+B+Mn yielded 9·1 kg. curds per frame, compared with 3·9 kg. for plants raised in similar nutrient blocks without the micro-nutrients.

2827. BOTTING, G. W.
Molybdenum deficiency in brussels sprouts.
J. Dep. Agric. S. Aust., 1955, **58**: 246, 253, illus.

Brussels sprouts suffering from Mo deficiency show interveinal chlorosis, and become stunted and straggly. Older leaves drop off and few sprouts are formed. Whiptail is rarely seen. High soil acidity reduces the amount of Mo available to the plant, thus lime dressings may help to correct the deficiency. Control may be obtained by applying 1 oz. ammonium molybdate or 1⅓ oz. sodium molybdate to 10 square yards of seed bed 2–3 weeks before transplanting.

2828. BRANDENBURG, E.
Molybdenbrist hos blomkål. (**Molybdenum deficiency in cauliflower.**)
Växt-närings-Nytt, 1954, **10**: 36-44, from abstract in *Soils and Ferts*, 1955, **18**, No. 912.

A deficiency disease the main symptoms of which were a dying off of the growing points or a deformation of the inner leaves was observed in Germany in 1952-53. The incidence of the symptoms was markedly reduced by the application of sodium molybdate at the rate of 2–4 kg./hectare.

2829. ANON.
Molybdenum deficiency trials on brassica crops.
Comm. Gr, 1955, No. 3093, p. 797.

A short report is given on extensive trials by the Horticultural Instructors in Co. Wexford, Ireland, on molybdenum deficiency in sprouts. Sodium molybdate was applied either as soil applications of ½, 1 and 2 lb. per acre, which were watered in, or as foliar sprays at ⅒ and ½ lb. per acre. On the control plots sprouts were soft or blown, and some plants produced only very small sprouts. The watered plots showed better control than the sprayed plots, the highest percentage of marketable sprouts being produced from the 2 lb. per acre plot.

2830. NOLL, J.
Herzlosigkeit an Blumenkohl (Beobachtungen aus zwei Anbaugebieten). (**Whiptail of cauliflower. (Observations in two areas.)**)
NachrBl. dtsch. PflSchDienst, Berlin, 1954, **8**: 209-14, bibl. 20, illus.
Herzlosigkeit an Blumenkohl, eine Molybdänmangelerscheinung. (**Whiptail of cauliflower, a symptom of molybdenum deficiency.**)
Dtsch. Gartenb., 1955, **2**: 129-31, illus.

Symptoms of whiptail in cauliflower, as observed in two areas in Eastern Germany, are described and illustrated. The trouble was alleviated or cured by applications of sodium molybdate (4 kg./hectare) but aggravated by applications of borax in addition to molybdenum. Any check to the growth of the young plants in the field after planting out also caused an increase in the severity of the symptoms. Application of molybdenum prior to planting gave better results than watering the plants with a solution of the nutrient. Liming where necessary and the use of neutral potting soil are also recommended. Where the latter showed Mo deficiency, the addition of 1 g. sodium molybdate per 100 kg. soil was found to be sufficient.—Biol. Zentralanst. Kleinmachnow.

2831. BELJAK, B. I.
The use of waste water in frost control. [Russian.]
Sad i Ogorod, 1955, No. 3, pp. 22-4.

In trials with early cabbage in April, 1951, and tomatoes in May, 1952, furrow irrigation with warm industrial waste water applied overnight either alone or in combination with smoking (burning dung) gave complete frost protection of the newly set out plants. Smoke alone was ineffective, resulting in almost as severe frost injury as occurred on the untreated control plots. In 1953 the water was applied for shorter periods with equally good results. In 1954 sprinkler irrigation was also used on early cabbage and proved more effective than furrow irrigation.

2832. BAIN, D. C.
Research points to blackrot resistant variety of cabbage.
Miss. Fm Res., 1955, **18** (2): 2, illus.

Inbreeding at the Mississippi Agricultural Experiment Station has resulted in strains of Huguenot and Round Dutch cabbage highly resistant to blackrot. Resistance was inherited as one or more dominant factors. The combination of resistance with desirable commercial types remains to be accomplished. [See also *H.A.*, 24: 3813.]

2833. BAIN, D. C.
Disappearance of blackrot symptoms in cabbage seedlings.
Phytopathology, 1955, **45**: 55-6, bibl. 4.

In experiments in which seedlings of a susceptible and a resistant variety were raised from disease-inoculated seed, black rot symptoms failed to develop in the leaves of some plants that had diseased cotyledons, the disappearance of the symptoms apparently being due to differences in varietal reaction. The percentages of diseased-cotyledon plants that later developed leaf symptoms were 89 and 41 in the susceptible and the resistant variety respectively.—Truck Crops Branch Exp. Stat., Crystal Springs, Miss.

2834. CROSSAN, D. F.
Cercosporella leafspot of crucifers.
Tech. Bull. N.C. agric. Exp. Stat. **109**, 1954, pp. 23, bibl. 33, illus.

A leaf spot of crucifers caused by *Cercosporella brassicae* occurs commonly in N. Carolina and causes serious losses of turnip and other crucifers grown for greens. A study of the symptoms, host range, physiology of the causal organism and epiphytology is reported. Disease development is favoured by low temperatures (mean daily temperatures between 55 and 65° F.), high humidity and splashing by rain. The fungus may persist in diseased leaf refuse on or in the soil for at least 9 months. Wild hosts may serve as a reservoir of inoculum and observations strongly suggest that the pathogen is seed-borne. Thorough ploughing and discing following harvest and again prior to planting are suggested as a means of reducing initial infection from diseased leaf refuse. Crop rotation should be practised, wild hosts destroyed, and disease-free seed used. Spraying with wettable Spergon (49% chloranil) 4-100 has been shown to be a promising means of control.

2835. Campbell, L.
An economical control of black root of cauliflower.
Plant Dis. Reptr, 1954, **38**: 859.

PCNB, either rototilled in to a depth of 2 in. or applied on the surface, gave excellent control of black root (*Corticium solani*) of cauliflower. The lightest rototilled treatment (50 lb./acre) gave 0·83% diseased plants compared with 23% in the control and the lightest surface treatment (10 lb./acre) gave 0·34% compared with 33·71%, reductions of 96 and 98% respectively.—W. Wash. Exp. Stat., Puyallup.

2836. Epps, W. M.
Fungicides for downy mildew control of heading cabbage.
Plant Dis. Reptr, 1955, **39**: 89-90, bibl. 7.

Of 10 fungicidal dusts tested for the control of cabbage downy mildew (*Peronospora parasitica*) tetrachloro-p-benzoquinone (spergon, chloranil) was the best, giving nil–6·1% severely diseased heads compared with 10·4–43·7% in the control. Applications were made every 5 days from 2 weeks before harvest to the end of the harvest period, normally 6 applications being made. In 3 years out of 4 the 5% dust was as good as the 10%. The field use of 5% chloranil is considered to be economically possible in the locality in question.—Clemson Coll. Truck Exp. Stat., Charleston, S.C.

2837. Snyder, W. C., and others.
Chemical control of clubroot disease of brussels sprouts.
Calif. Agric., 1955, **9** (4): 8-11, illus.

Three separate papers appear under this heading.

The first describes trials which showed that a fair measure of control of *Plasmodiophora brassicae* can be obtained by adding to the setting water used in transplanting mercuric chloride at 1 in 2,000, or pentachloronitrobenzene (PCNB) at 1 in 1,600 or 1 in 400, or captan at 1 in 1,600 or 1 in 400. PCNB appears to offer particular advantages, being less injurious to the plants in dry soils than $HgCl_2$ and non-corrosive to metals.

The second paper describes encouraging preliminary work in breeding clubroot-resistant brussels sprouts.

The third paper describes a liquid drop valve which, fitted to a planting machine, supplies measured amounts of water plus fungicide to each plant.

2838. Reich, R.
Ein gefährlicher Kohlschädling. (**A dangerous pest of cabbage.**)
Dtsch. Gartenb., 1955, **2**: 132-4, bibl. 5, illus.

The swede midge, *Contarinia nasturtii*, causes considerable damage to cauliflower, cabbage and other brassicas in Eastern Germany. Its biology is discussed in some detail and feeding injuries are illustrated. In the case of cabbage and cauliflower twice weekly applications of contact insecticides are desirable from the end of May onwards. It is hoped that the dates of emergence will be more closely defined and that a warning service will be instituted. Cultural control measures, such as crop rotation and deep ploughing are also recommended.—Biol. Zentralanst. Erfurt.

2839. Dills, L. E., and Odland, M. L.
Insecticide tests with cabbage caterpillars and aphids.
J. econ. Ent., 1954, **47**: 992-5, bibl. 8.

Against caterpillars of cabbage looper, *Trichoplusia ni*, imported cabbage worm, *Pieris rapae*, and diamond back moth, *Plutella maculipennis*, infesting cabbage, low concentrations of insecticides including DDT, TDE, dieldrin and aldrin were applied as dusts. The use of TDE at 0·25, 0·5 and 1% resulted in the least caterpillar damage of any of the materials tested for more than 1 year. Against cabbage aphid, *Brevicoryne brassicae*, 1% lindane dust was the most effective.—Pa agric. Exp. Stat.

2840. David, W. A. L., and Gardiner, B. O. C.
The action of the systemic insecticide, Systox, on *Pieris brassicae* (L.) and *Phaedon cochleariae* (F.).
Bull. ent. Res., 1954, **45**: 693-702, bibl. 6.

Systox has been tested as a systemic insecticide against the eggs and larvae of *Pieris brassicae* and the eggs, larvae and adults of *Phaedon cochleariae*. Systox is toxic by direct contact to all stages of these insects but is much less effective in this way than diethyl p-nitrophenyl phosphate (paraoxon). As a systemic insecticide applied to the roots of the host-plant, Systox again acts on all stages of the insects (except the eggs of *Phaedon*) but, compared with the dose which killed aphids, about twice as much is required to kill *Phaedon* larvae and between 20 and 100 times as much to kill *Pieris* larvae, depending on the method employed. When applied systemically Systox, like paraoxon, can prevent the emergence of *Pieris* larvae from the eggs. [From authors' summary.]—Agric. Res. Counc., Unit Insect Phys., Cambridge.

Celery.

(*See also* 2790.)

2841. Luddington (N.A.A.S.).
Intensive cultivation section.
Rep. Luddington exp. Hort. Stat. for 1953, 1954, pp. 35-43.

Self-blanching celery: a spacing trial in Dutch lights was carried out at 3 Horticulture Stations. Optimum spacing varied between 9 and 11 inches square. The spacing giving the highest yield decreased as the crop matured. *Orientation of Dutch lights:* with high-ridge, double-span lights over lettuce, the north-south pair outyielded the east-west pair. *Tomato variety trials:* Kvithemar and Carleton gave somewhat higher yields than Market King in a Dutch light structure, but were not considered to be superior to Moneymaker in an open ground trial.

2842. Heydecker, W.
More rapid germination of self-blanching celery.
Grower, 1955, **43**: 619-20.

In experiments at Sutton Bonington germination of unchitted celery seed, at a constant temperature of

70° F. and in diffuse light, started in 9 days and was finished 14 days after sowing. The seed was sown in boxes on top of J.I. seed compost. The box was dipped in water until the soil was thoroughly wet. A sheet each of glass and newspaper was used to cover the box, so that there was no gap between the glass and the rim of the box. Seed treated in this way germinated more rapidly than seed covered with soil, whether chitted or unchitted. The variety used was Harrison's Golden Detroit.

2843. Eriksen, I., and others.
Kvaelstofforsøg i køkkenurter [selleri]. **(Nitrogen trials with celery.)**
Årbog Gartneri 1954, 1955, pp. 168-79.

On a sandy soil and on an intermediate soil yield responses were obtained from calcium nitrate applications at rates up to 2,700 kg. and 900 kg. per ha. respectively, while celery grown on a rich marsh soil did not benefit from N manuring. A panel of tasters did not detect any influence of nitrogen supply on the flavour of raw or cooked celery.

2844. Westgate, P. J., Blue, W. G., and Eno, C. F.
Blackheart of celery and its relationship to soil fertility and plant composition.
Proc. Fla St. hort. Soc. for 1954, pp. 158-63, bibl. 11.

Celery plants of the Pascal variety were used in experiments to study the effect of different rates of a complete (5-5-8) fertilizer on the incidence of blackheart. There was an increase of blackheart occurrence with increased rates of fertilizer. N and P concentrations in the plants increased at the lower rates, but remained fairly constant at the higher rates of application. Na and K increased at all rates. Ca decreased with increased fertilizer rates. The authors suggest that low Ca and blackheart may have resulted from excess Na and K in the soil and plant.

2845. Wageningen, Plantenziektenkundige Dienst.
Proeven ter bestrijding van de bladvlekkenziekte, *Septoria apii* (Bri. and Cav.) Chester in selderie, *Apium graveolens* L. **(The control of leaf spot disease of celery.)**
Jaarb. PlZiekt. Dienst, Wageningen 1953, 1954, pp. 118-20.

Six sprays of various materials were applied during July-September to control leaf spot on celeriac. 1% bordeaux gave the best control of the disease, followed by 0·75% copper oxychloride. In tests on control of the disease on celery for seed, copper oxychloride increased the yield by 136% over the control, and only 2% of the seeds from this treatment were infected.

2846. Rich, A. E.
The occurrence and control of *Paratylenchus hamatus* on celery in New Hampshire.
Plant Dis. Reptr, 1955, **39**: 307.

Poor root development, severe stunting and chlorosis in celery were found to be due to the nematode *Paratylenchus hamatus*. The nematode population was much reduced by cropping the area for one year with lettuce and spinach, and was eliminated by repeating this cropping system for a second year.—N.H. agric. Exp. Stat.

2847. Van Middelem, C. H., and Wilson, J. W.
Parathion residues on celery.
J. econ. Ent., 1955, **48**: 88-90, bibl. 13.

Chemical analyses of parathion were made on celery sprayed weekly for 2, 3 and 4 months to determine the amount of residues remaining on the crop at harvest. The experiment was conducted over 2 seasons, and from the data obtained it is concluded that by applying recommended rates of parathion at weekly intervals and allowing a 7-day weathering period, unwashed celery can be sent to market from Florida with residues below 2 p.p.m.

Cucurbits.

(*See also* 2333, 2398, 2992m, 3249, 3250, 3408o.)

2848. Riethus, H., and Grunewald, J.
Versuche zur Verwendung von Wirkstoffen bei der Gurkenanzucht. **(Experiments on the use of stimulating substances in the raising of cucumbers.)**
Festschr. 25jähr. Bestehen gärtn. Hochschulstud. Deutschland, 1954/55, pp. 153-64, bibl. 22.

In one year's trials 28 substances, including hormones and vitamins, were applied in 3 concentrations to cucumber seed and seedlings. The following 7 compounds increased the rate of growth in young plants by 22–40% at the concentrations stated: l-ascorbic acid (10^{-3}; 40%), indole (10^{-4}; 40%), adenine (10^{-10}; 39%), indole-3-butyric acid (10^{-2}; 30%), phenylarcyl acid (10^{-5}; 28%), aneurin (10^{-1}; 26%), dl-alanin (10^{-6}; 22%). Although yields were not affected, further studies may show that such treatments will shorten the time required to raise cucumber plants.—Tech. Univ. Berlin-Charlottenburg.

2849. Anderson, W. S.
Breeding program produces better cucumber varieties.
Miss. Fm Res., 1955, **18** (2): 7, illus.

Data are tabulated on yields and processing quality of some new varieties of pickling cucumbers.

2850. Petersen, V. J., and Nielsen, H.
Forsøg med topdressing af agurker. **(Top dressing trials with cucumber.)**
Årbog Gartneri 1954, 1955, **36**: 146-58.

The comparison of nitrogen sources for glasshouse cucumbers [*H.A.*, 24: 2671] was continued in 1954. Yields and quality of plants supplied with a mixture of compost and stable manure were excellent, and some combinations of organics and artificials also gave very satisfactory results. The most successful combinations were calcium nitrate plus sphagnum moss and alternate applications of ammonium sulphate and organics, the latter especially when the lime and potassium content of the soil was high and some manganese was present.

2851. Tuljženkova, F. F.
The effect of pollination by bees on a yield of cucumbers grown under cover in the Far North. [Russian.]
Sad i Ogorod, 1955, No. 4, pp. 24-5.

Some data are given showing that frame and glasshouse grown cucumbers pollinated by bees produced higher yields of better quality and at lower cost than those pollinated by hand. The bees were given supplementary food and during warm weather were rested outdoors. At first the imported bees worked right through the polar nights, but after 5–10 days flights were seen only between 3–4 a.m. and 4 p.m.

2852. AMEN, C. R., AND PORTER, C. A.
The spread of cucumber mosaic virus in cucumber plantings during harvesting.
Plant Dis. Reptr, 1954, **38**: 841-3.

Field experiments conducted at Corvallis, Oregon, during 1951 and 1952 showed that harvesting can be the major factor responsible for disease spread. [From authors' summary.]—Ore. agric. Exp. Stat., Corvallis.

2853. PRAMER, D., AND WRIGHT, J. M.
Some phytotoxic effects of five actinomycete antibiotics.
Plant Dis. Reptr, 1955, **39**: 118-19, bibl. 14.

Cucumber (and other) seeds were treated with chloromycetin, aureomycin, terramycin, streptomycin and neomycin at 100 and 500 p.p.m. The percentage germination was not significantly influenced by any treatment, but in all cases inhibition of root (and to a lesser extent of shoot) growth occurred. No stimulation of root growth or formative effects were observed. The first 3 were more toxic than the last 2. Neomycin did not inhibit chlorophyll formation but the other antibiotics did so in varying degrees.—Imp. Chem. Ind. Ltd, Butterwick Res. Lab., Welwyn, Herts.

2854. MCKEEN, C. D.
Observations on the occurrence and control of powdery mildew on greenhouse cucumbers in Ontario.
Plant Dis. Reptr, 1954, **38**: 860-3, bibl. 6.

Karathane (dinitro capryl phenyl crotonate) was better than sulphur or copper sulphate for the control of *Erysiphe cichoracearum* on greenhouse cucumbers. Karathane smoke was best, followed by spray and then by dust. Three smoke treatments at 6-day intervals followed by 1 per fortnight gave and maintained good control.—Sci. Serv. Lab., Harrow, Ontario.

2855. HARCOURT, D. G., AND CASS, L. M.
Toxicities of various insecticides to cucumber.
Canad. J. agric. Sci., 1955, **35**: 19-26, bibl. 16.

In field experiments at Ottawa, 1950-1952, four applications of dusts of 1% lindane, 1% rotenone, 3% nicotine, calcium arsenate-talc (1–10), calcium arsenate-COCS* (1–10), or COCS-talc (10–1) were neutral in their effects on the test plant, Straight Eight cucumber. Four applications of dusts of 3% technical-grade DDT or 3% aerosol-grade DDT caused severe stunting of the vines and markedly reduced yields. Eight applications of 1% lindane dust gave increased yields in 1951, but did not influence yield in 1950 and 1952. Eight applications of 3% methoxychlor dust were neutral in 1950 and 1952, but caused moderate stunting and yield reductions in 1951. Eight applications of either grade of DDT dust caused severe stunting and yield reductions each season. Severe foliage injury occurred in DDT-treated plots, slight to moderate injury in those treated with methoxychlor or COCS. [Authors' abstract.]

* Copper oxychloride sulphate.

2856. DE LA ROCHA GARCÍA, G.
Cultivo del melón. (**Melon growing [in Peru].**) [English summary ½ p.]
Circ. La Molina agric. exp. Estac. **68**, 1954, pp. 20, bibl. 10, illus.

Information is given on climatic and soil requirements, culture, yields, seed production, crossing American and local varieties at La Molina, characters of the main foreign and locally bred varieties in use in Peru, pests and diseases. In experiments on the control of the pickleworm, *Diaphania* spp., weekly sprays of 0·5% DDT gave very good results, namely crops of over 20,000 kg. per ha. compared with 9,000 after the next best treatment (bagging the fruit) and 900 in the control. DDD (rhothane) has recently given even better control.

2857. ANDRUS, C. F.
New watermelon varieties.
Seed World, 1955, **76** (5): 36-40, illus.

A description is given of 9 new or relatively new watermelon varieties, of which Charleston Gray is the most outstanding. It is resistant to wilt and anthracnose and is suitable for shipping and home gardens.

2858. BOUHELIER, —., AND OTHERS.
Études sur les pastéques. Compte-rendu d'essais comparatifs de variétés en culture irriguée. (Stations Regionales Horticoles d'Ain Chaib et Marrakech.) (**Watermelon varietal trials in irrigated culture at the Ain Chaib and Marrakech Regional Horticultural Stations.)**
[*Mimeo. Publ.*] *Serv. Hort. Maroc.* **16**, 1955, pp. 19.

The 8 United States varieties tested were earlier and of better flavour than the 2 Moroccan varieties, de Hongrie and Beldi. Dove and Chilean Black Seed showed particular promise. The best time for sowing appeared to be the latter half of February.

2859. DEREVJANKO, S. N.
The stimulating action of BHC on the development of watermelons. [Russian.]
Sad i Ogorod, 1955, No. 4, pp. 73-4.

It was observed earlier that BHC applied for wireworm control stimulated the growth of watermelons. In small-scale trials in 1953 and 1954 seed of different watermelon varieties was treated with 12% BHC dust, for stimulation only. Treatment resulted in earlier opening of the male flowers and 11 and 9% increases in early yields respectively, compared with the controls.

2860. RANKIN, H. W.
Effectiveness of seed treatment for controlling anthracnose and gummy-stem blight of watermelon.
Phytopathology, 1954, **44**: 675-80, bibl. 10, illus.

Watermelon seed treatments in general use did not completely eradicate *Colletotrichum lagenarium* or *Mycosphaerella melonis*. Mercuric chloride (1–1,000 $HgCl_2$ for 5 minutes, washed for 10 minutes and then dried) gave the best control of the 7 materials used. Seed disinfectants were more effective as solutions or suspensions than as dusts. Seedling infection by both *C. lagenarium* and *M. melonis* occurred at, or a little below, ground level. [From author's summary.]—Ga Coastal Plain Exp. Stat., Tifton.

2861. Beecher, F. S.
Control of downy mildew on cucumbers and muskmelons with tank mixtures of a fixed copper and a dithiocarbamate.
Plant Dis. Reptr, 1955, **39**: 220.

In the 1953 tests a tank mixture of tri-basic copper sulphate with Dithane Z-78 (3: 2: 100) gave the best mildew (*Pseudoperonospora cubensis*) control on cucumbers, while on muskmelons a tri-basic copper sulphate-ziram (Zerlate) mixture (3: 2: 100) appeared somewhat better. For control of angular leaf spot (*Pseudomonas lachrymans*) on cucumbers, the tri-basic copper sulphate-Dithane Z-78 mixture was a close second to the tri-basic copper sulphate alone. In 1954, tank mixtures of tri-basic copper sulphate with zineb or ziram, as well as alternate sprays of the same materials, were tested again. Field tests on both cucumbers and muskmelons showed that a tank mixture (3: 2: 100) of tri-basic copper sulphate with Dithane Z-78 gave better control of downy mildew than any other material tested. This mixture proved even better than a spray of tri-basic copper sulphate (4: 100) alternated with Dithane Z-78 (2: 100). All sprays were applied at 7-day intervals at pressures of about 200 lb. A spreader ("Tween 20") and an insecticide ("Tubacide", a rotenone extract) were added to all sprays. No foliage injury due to the spray materials was seen at any time.—U.S. Dep. Agric., Beltsville, Maryland. [See also *H.A.*, 24: 449.]

2862. Crall, J. M.
Fungicidal spray trials for the control of watermelon leaf spots.
Proc. Fla St. hort. Soc. for 1954, pp. 130-2.

In 1953 spray trials downy mildew (*Peronoplasmopara cubensis*) control was better with zineb than with captan, though yields were significantly higher with captan due to a larger number of melons produced. In 1954 spray trials zineb, Crag 658 and tribasic copper sulphate gave the best control of downy mildew and gummy stem leaf spot (*Mycosphaerella citrullina*); maneb and dichlone gave intermediate control, while ferbam, captan and the nabam mixtures with Mn and Zn sulphates were the least effective. Maneb and nabam-manganese sulphate caused slight leaf burning, and dichlone was definitely phytotoxic. Early yields were significantly lower after dichlone and tribasic copper sulphate, and somewhat lower (not significantly) after ferbam, captan, and nabam-manganese sulphate sprays. Total yields from all sprayed plots were higher than from the control plots.

Legumes.

(*See also* 2333, 2335, 2345, 2348, 2349, 2354, 2355, 2366, 2367, 2370, 2411a, x, 2412c, 2587, 2718, 2992k, t, v, x, 2993g.)

2863. Reynolds, J. D.
Development of the Dried Pea Seed Approval Scheme [in Great Britain].
Agriculture, Lond., 1955, **61**: 593-8, bibl. 4.

The genetic instability of many varieties of peas, aggravated by lack of selection work and roguing during the Second World War, led to a serious deterioration in the quality of marrowfat pea seed stocks in Great Britain. To remedy this the Dried Pea Seed Approval Scheme has been built up gradually from small beginnings over the last ten years until some 8,000 acres of crops were field-inspected in 1954. The scheme has already resulted in a marked improvement of the position.

2864. Singh, R. L.
Varietal studies with table peas.
Indian J. Hort., 1954, **11**: 113-18.

Results are given of varietal trials with 19 varieties of table peas. Of the determinate varieties which do not require staking Early Alaska, I.P.29 and N.P.163 proved to be most suitable for the production of pods during December, January and February-March respectively. Among the indeterminate varieties which require staking Mammoth Podded, Kape and Ford Hook Wonder were best for the 3 periods respectively. [From author's summary.]—Fruit Res. Stat., Saharanpur, U.P.

2865. Hare, W. W.
Progress made in breeding disease resistant peas.
Miss. Fm Res., 1954, **17** (11): 2, 6, illus.

Selection work is being carried out at the Mississippi Agricultural Experiment Station to obtain a Fusarium wilt resistant variety of the Brown Sugar Crowder type of southern or cow pea. A selection, called Mississippi S-1, has been obtained which is highly resistant to race 1 and tolerant to races 2 and 3 of *Fusarium oxysporum* f. *tracheiphilum*.

2866. Brown, H. D., Peters, G., and Gould, W. A.
Evaluation of lima bean varieties for dehydration.
Res. Bull. Ohio agric. Exp. Stat. **751,** 1954, pp. 13.

The results of studies of 12 lima bean varieties in 1951/52 were: (1) the highest and lowest yields of shelled beans per acre were 3,200 lb. in Fordhook 242 and 970 lb. in Emerald; (2) Fordhook 242 beans were the largest and most uniform in size, 91% of the first picking averaging ½ in. in diameter; (3) the best of 3 briefly described dehydration methods tested was that in which the beans were blanched and frozen before being dried; (4) in an evaluation of reconstituted dehydrated beans 4 varieties were rated satisfactory, 2 had better colour than canned beans of the same variety, and several samples were actually rated as good as or better than the corresponding canned samples in all of the 3 quality factors considered, namely flavour, colour and texture.

2867. Zaumeyer, W. J.
Snap beans for marketing, canning, and freezing.
Fmrs' Bull. U.S. Dep. Agric. **1915,** revised 1954, pp. 16, illus., 10 cts.

Environmental requirements, varieties, culture, control of diseases and pests.

2868. Inoue, Y., and Suzuki, Y.
Studies on flower bud differentiation, flowering and fruiting of peas, *Pisum sativum* L. I. Flower bud differentiation. [Japanese, English summary ⅓ p.]
J. hort. Ass. Japan, 1954, **23**: 177-82, bibl. 7, illus.

Fourteen varieties of pea were sown at 3 different dates, i.e. 29 November, 10 March, and 10 April. Early varieties tended to differentiate their flower buds and open their flowers earlier than the later varieties, both in winter and spring sowings. In winter sowings about twice as many days were required for flower bud initiation as in spring sowings. The number of days required from flower bud initiation to flowering varied considerably with variety but it was not related to the earliness of the variety: a longer time was required in winter than in spring. With winter sowing flower bud initiation occurred when the plants had about 6 leaves, but with spring sowing it generally occurred at a later stage of vegetative development, the number of leaves varying considerably with the variety. Flower bud differentiation took place first on the main stem, except in varieties which branched vigorously at the lower nodes when differentiation took place on the main stem and the strongest lateral simultaneously. On laterals differentiation occurred from the lower nodes upwards.

2869. Shukla, T. C.
Photoperiodic induction in *Lens esculenta* Moench.
Sci. and Cult., 1955, **20**: 389-90, bibl. 2.

Continuous illumination was shown to shorten the vegetative phase of lentils by 20 days and the reproductive phase by 9 days.—A.S. Jat. Coll., Lakhaoti, Bulandshahr.

2870. Benda, G. T. A.
Some effects of ultra-violet radiation on leaves of French bean (*Phaseolus vulgaris* L.).
Ann. appl. Biol., 1955, **43**: 71-85, bibl. 19.

Exposing the primary leaves of French bean to ultraviolet light produces a variety of effects, their magnitude depending on the extent of the exposure and the subsequent treatment of the leaves. Effects include some that are externally obvious, such as glazing and bronzing; others are detectable by changes in susceptibility to virus infection, by increased sensitivity to damage by ultra-violet, and by an increased tendency for cells to collapse when the leaves are kept in darkness. Some of the effects can be counteracted by exposing leaves to visible light. Effects of radiation are not confined to epidermal cells, and measurements with detached epidermis indicate that from a quarter to a half of incident radiation of wave-length 2536Å. may be transmitted by the epidermis. The susceptibility of irradiated leaves to infection by a tobacco necrosis virus, as measured by the number of lesions produced by a given inoculum, depends on the irradiation dose, the time elapsing between irradiation and inoculation, and on whether the plants are in the light or dark after the treatments. [From author's summary.]—Rothamsted exp. Stat.

2871. Sterling, C.
Nucellus and endosperm in the seed of lima bean (*Phaseolus lunatus* L.).
Bull. Torrey bot. Cl., 1955, **82**: 39-49, bibl. 30, illus.

The development of nucellus and endosperm after flowering in lima bean was studied. It is concluded that neither tissue can serve as a guide for assessing bean maturity for freezing or eating, as both break down and become unrecognizable before maturity.—Univ. Calif.

2872. Hubbeling, N.
Ziekten en beschadigingen van bonen. **(Pests and diseases of beans.)** [English summary 1¼ p.]
Tuinbouwvoorlichting **3**, 1955, pp. 80 + 32 pp. plates, bibl. 81, illus., fl. 2.25.

In this useful publication the author deals with virus, bacterial and fungus diseases, nutritional disorders and injuries caused by climatic conditions and pests. Symptoms, occurrence, and control measures are described and discussed, and a chapter on the choice of resistant varieties is also included. In addition there is a collection of 32 detachable coloured plates which have Dutch, English, French and German sub-titles; each plate has a short account of the causal agent and its control in Dutch and English on the back.

2873. Hubbeling, N.
Een virus als oorzaak van de zogenaamde "voet-ziekte" bij erwten. **(A virus as the cause of the so-called "foot-rot" of peas.)**
Reprinted from *Zaadbelangen*, 1954, nr. 14, as *Meded. Inst. PlZiekt. Onderz. Wageningen* **78,** 1954, pp. 2, illus.

The author considers that foot-rot disease in peas and beans, thought to be due to *Fusarium solani*, is caused by a virus disease, "leaf-roll", transmitted by aphids. In infected plants the leaves become yellow and narrow and are often rolled; growth is inhibited. Resistant and susceptible varieties are listed.

2874. Bovey, R.
Les maladies à virus du haricot. **(Virus diseases of beans.)**
Rev. hort. suisse, 1955, **28**: 147-50, bibl. 4, illus.

Two distinct bean virus diseases are found in Switzerland, and their symptoms and transmission are described. Some control of Phaseolus virus 1 is possible by using healthy seed and resistant varieties. The spread of Phaseolus virus 2 may be arrested by growing beans some distance from gladiolus.—Stats féd. Ess. agric. Lausanne.

2875. Cheo, P. C.
Effect of seed maturation on inhibition of southern bean mosaic virus in bean.
Phytopathology, 1955, **45**: 17-21, bibl. 13.

Virus of southern bean mosaic was present in all flower and fruit parts of systemically infected bean varieties. As seed matured, the virus content of the embryo increased while that of the seed coats and the pod decreased. Virus in the embryo was inhibited very rapidly when dehydration of the seed occurred, but not in seed coats and leaves. Crude extracts from bean seed had an inhibiting effect on the virus when added to southern bean mosaic virus. Investigations on the inhibitor are discussed. [From author's summary.]—Hort. Crops Res. Branch, U.S. Dep. Agric., Beltsville, Maryland.

2876. QUANTZ, L.
Ein Ringfleckenvirus von Buschþohnen. **(A ring-spot virus of dwarf beans.)**
Phytopath. Z., 1955, **23**: 209-20, bibl. 21, illus.

Leaf necrosis of dwarf beans was shown to be caused by a ring-spot virus which was transmitted experimentally to 59 bean varieties. Serological and pre-immunity tests indicate that the virus is closely related to *Solanum virus deformans* of potatoes.—Inst. landw. Virusforsch., Brunswick.

2877. MARLATT, R. B.
Effectiveness of streptomycin as a control for common bacterial blight of Pinto bean.
Plant Dis. Reptr, 1955, **39**: 213-14, bibl. 5.

Although streptomycin has been reported elsewhere to give control of common bacterial blight (*Xanthomonas phaseoli*), spraying, dusting and seed treatment all failed to give significant control in the tests herein reported.—Ariz. agric. Exp. Stat., Mesa.

2878. MASTENBROEK, C.
Over de bestrijding van de vetvlekkenziekte in stambonen. **(Control of halo blight in beans.)** [English summary ½ p.]
Tijdschr. PlZiekt., 1955, **61**: 29-34, bibl. 3.

Halo blight, caused by *Pseudomonas medicaginis*, is an important economic disease of beans in the Netherlands. Fairly satisfactory control was obtained by roguing diseased plants and those surrounding them within a radius of 1–2 m.; roguing diseased plants only was not sufficient. Healthy plants could be grown from disease-free seed. In tests with inoculated plants, spraying with 1% Koper Bayer soon after flowering had started kept the percentage of diseased pods very low. Spraying should be started when the primary leaves are fully grown, and carried out 3 times at fortnightly intervals.

2879. GRÜMMER, G., AND MACH, F.
Die Behandlung brennfleckenkranker Bohnen mit Patulin und Streptomycin. **(The treatment with patulin and streptomycin of beans affected with anthracnose.)**
Zbl. Bakt., Abt. 2, 1955, **108**: 449-64, bibl. 14, illus.

Beans affected with anthracnose (*Glomerella lindemuthianum*) and healthy beans were soaked in solution of patulin and streptomycin. The testa of healthy beans proved impermeable during the early phases, but the antibiotics immediately penetrated into the interior of beans, the testa of which was partly destroyed by the pathogen. Streptomycin was translocated from the cotyledons to the radicle. The tabulated data show that it is possible almost completely to disinfect diseased bean seed by treatment with a 0·05% streptomycin solution. At present, however, the price of the antibiotic is too high to render its application economically feasible.—Ernst-Moritz-Arndt Univ., Greifswald.

2880. KINGSLAND, G. C., AND RICH, A. E.
Studies on the cause and control of pea root rot in New Hampshire.
From abstr. in *Phytopathology*, 1955, **45**: 185.

Of 9 soil fungicides tested for the control of pea root rot, caused by *Fusarium solani*, only Stauffer N-869 (sodium methyldithiocarbamate) increased the yield significantly by comparison with the control. Varietal resistance is discussed.

2881. WALTERS, H. J.
Effect of seed treatment on bean root rot.
Plant Dis. Reptr, 1954, **38**: 856-7.

Seed treatments with various fungicides applied as dusts or in conjunction with methocel as a sticker did not give control of root-rotting organisms.—Wyoming agric. Exp. Stat., Laramie.

2882. WALTERS, H. J.
Effect of irrigation on bean root rot.
Plant Dis. Reptr, 1955, **39**: 101-2.

Root rot due to *Fusarium* spp. is widespread in irrigated bean fields in Wyoming. In experiments on 3 bean varieties over 4 years yields were higher, though not always significantly so at the 5% level, with light, frequent irrigation every 5–7 days throughout the season, than with heavy, infrequent irrigation.—Wyo. agric. Exp. Stat., Laramie.

2883. VAN DER VLIET, M.
De bestrijding van de bonenroest. **(Control of bean rust.)**
Jaarb. PlZiekt. Dienst, Wageningen 1953, 1954, pp. 249-50, being *Meded.* **124.**

Preventive and curative applications of zineb, captan and nirit were applied to French beans to control bean rust, *Uromyces phaseolorum.* Four preventive sprays of zineb, atomized at 4%, in July and August gave better control of infection than curative zineb sprays or captan spray applications. Sprays of zineb at 5% and 3·5% gave equally good control when applied after the first rust spots had appeared.

2884. MOORE, W. D., AND CONOVER, R. A.
Chemical soil treatments for the control of Rhizoctonia on snap beans.
Plant Dis. Reptr, 1955, **39**: 103-5, bibl. 4.

In field tests on a number of chemicals PCNB (75% wettable powder) and the experimental compound 363 (similar to PCNB) significantly reduced *Rhizoctonia solani* infection on snap beans. Since these materials are not water soluble and do not penetrate the soil readily, they require special methods of application for best results. Apparently, applications as sprays or dusts are effective if the materials are applied so that the seed and surrounding soil are well covered. Efficiency of the materials depends upon the thoroughness of their incorporation into the soil. In these tests considerable variation in degree of control occurred in different soil types when the same amounts of PCNB were used, the greatest response being found on marl soils and the least on muck. Nevertheless, in all cases significant reduction in disease incidence was obtained with amounts that would not be prohibitive in cost to the average grower. [From authors' summary.]—Agric. Res. Serv., U.S.D.A., and Fla agric. Exp. Stat.

2885. Franssen, C. J. H.
De schadelijke insecten en mijten van onze Nederlandse peulvruchten. **(Injurious insects and mites of pulse crops in the Netherlands.)**
Reprinted from "*15 Jaren P.S.C.*", 1954, pp. 108-54, bibl. 50, as *Meded. Inst. PlZiekt. Onderz. Wageningen* **74.**

Those insects and mites which are of economic importance on peas, *Phaseolus* and *Vicia* beans, vetch and lupin in the Netherlands are described, as well as virus vectors. The symptoms caused by the pests and control measures are also dealt with.

2886. Jacks, H.
Screening tests with insecticides for control of red spider-mite (*Tetranychus urticae* Koch) on beans.
N.Z. J. Sci. Tech., Sect. A, 1955, **36**: 454-9.

Forty-one insecticides were tested in the glasshouse for control of *Tetranychus urticae* Koch on dwarf and runner beans. Effective substances were classified according to the following properties. Contact effect: Materials based on mipafox, TEPP, malathon, and butylphenoxyisopropyl chloroethyl sulphite. Residual effect: Material based on chlorparacide. Contact and residual effect: Materials based on ethyl-p-nitrophenyl benzenethiophosphonate, parathion, dimefox, schradan, petroleum oil, and demeton. Other test materials were not so effective as the above. [Author's summary.]—Plant Dis. Div., D.S.I.R., Auckland.

2887. David, W. A. L., and Gardiner, B. O. C.
The action of the systemic insecticide, Systox, on aphids.
Bull. ent. Res., 1954, **45**: 683-92, bibl. 8.

As a contact insecticide against *Aphis fabae* on broad bean Systox is equitoxic with paraoxon and more toxic than schradan and dimefox. As a systemic it is very effective against *A. fabae*, and against *Myzus persicae* and *Brevicoryne brassicae* on cabbage, being more effective than schradan, dimefox and paraoxon and about equitoxic with the most toxic compound so far tested, sodium fluoracetate.—Agric. Res. Counc., Unit Insect Phys., Cambridge.

2888. Franssen, C. J. H.
De bestrijding van de tuinbonenkever, *Bruchus rufimanus* Boh., volgens de ontwikkeling van het gewas. **(The control of bean beetle in relation to the development of the crop.)** [English summary ⅓ p.]
Tijdschr. PlZiekt., 1955, **61**: 52-5.

Spraying should begin when the petals of the lowest flowers start to wither, but preferably not when the temperature is below 17° C. when the beetles are less active. A single application of 2 kg. technical DDT or 400 g. parathion per hectare should be sufficient for control.

2889. Lefèvre, P. C.
Un important parasite du haricot *Melanagromiza* (*Agromiza*) *phaseoli* Coq. **(An important bean pest, *Agromyza phaseoli*.)**
Bull. Inf. INEAC, 1955, **4**: 43-6, bibl. 3, illus.

Biology and control, including the use of the resistant Wulma variety of bean which is available in Kivu.

2890. Hely, P. C.
Further experiments in control of French bean fly.
Agric. Gaz. N.S.W., 1955, **66**: 92-3, bibl. 1.

Experiments in 1948 [*H.A.*, 19: 429] confirmed previous findings that DDT is a highly effective material for the control of French bean fly (*Agromyza phaseoli*), and it was shown that spraying with this material at a concentration of 0·05% gave complete protection against this pest. Some further experiments in 1949 indicated that DDT applications at weekly intervals would be quite effective. [Author's summary.]

2891. Saaltink, G. J.
Proeven over een zaadbehandeling van stambonen, *Phaseolus* sp. tegen de larven van de bonenvlieg. **(Experiments on seed treatment of dwarf French beans against larvae of bean seed fly.)** [English summary 5 lines.]
Jaarb. PlZiekt. Dienst, Wageningen 1953, 1954, pp. 238-43, being *Meded.* **124.**

Good results in controlling *Chortophila cilicrura* were obtained by seed treatment with 3–5 g. 20% lindane or 2 g. 20% aldrin or dieldrin used per kg. of seed. 20% chlordane at 4 g./kg. seed did not give sufficient control.

2892. Bremer, H.
Die Ackerbohnen-Minierfliege *Phytobia* (*Cephalomyza*) *cruciferícola*. **(*Phytobia* (*Cephalomyza*) *cruciferícola*, a pest of broad bean.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1955, **7**: 4, bibl. 2, illus.

In recent years *Phytobia* (*Cephalomyza*) *crucifericola* has become a serious pest of broad beans in some areas of the Rhineland. Repeated applications of DDT, lindane and toxaphene remained unsuccessful, but a single treatment with 0·035% E605 shortly before flowering proved effective. The biology of the fly and the leaf injuries it causes are described.—Inst. f. Gemüseb. u. Unkrautforsch., Neuss-Lauverburg.

2893. deZeeuw, D. J., and others.
Fungicide-insecticide combination seed treatment of beans for the control of damping-off and seed corn maggot.
Quart. Bull. Mich. agric. Exp. Stat., 1954, **37**: 204-17, bibl. 5, illus.

In greenhouse and field trials over a period of 2 years, lindane and dieldrin were the 2 most consistently effective insecticides. The fungicides thiram and captan were equally effective. The value of thiram-lindane and captan-lindane treatments on large-scale commercial plantings was demonstrated. Effective rates recommended for commercial use in slurry treaters are: insecticide—1 oz. 50% material (as wettable powder), fungicide—2 or 3 oz. 75% material (wettable powder) per 100 lb. seed.

2894. Díaz Mena, D.
Fitotoxicidad de cinco insecticidas aplicados al suelo en la germinación y primer crecimiento de cuatro cultivos. **(Effect of soil applications of 5 insecticides on germination and early growth of 4 crops.)** [English summary ½ p.]
Acta Agron. Palmira, 1954, **4**: 175-202, bibl. 14, illus.

The effects of soil applications of 5 chlorinated hydrocarbon insecticides at 5 rates were investigated on beans and field crops. In general the insecticides reduced germination in beans at all rates; for example, the germination rates with the lightest and heaviest applications of dieldrin were 39 and 30·5% respectively, compared with 43·3% in the control. The higher doses of dieldrin and aldrin caused stem curvature, stunting and poor root growth, but toxaphene, BHC and chlordane had little effect on growth.

2895. Sánchez E., O.
Efectos de tres insecticidas sobre los procesos de amonificación y nitrificación en el suelo y sobre la nodulación de dos leguminosas. **(Effects of three insecticides on ammonification and nitrification in the soil and on nodule formation in 2 leguminous plants.)** [English summary ¾ p.]
Acta Agron. Palmira, 1954, 4: 219-38, bibl. 13, illus.

A study was made of the effects of excessively heavy soil applications of BHC, chlordane and toxaphene on ammonification and nitrification in a loamy clay soil and on nodule formation in the bean (*Phaseolus vulgaris*) grown in sand. BHC slightly stimulated ammonification, reduced nitrification, considerably reduced nodule formation and germination, and caused root abnormalities. Chlordane stimulated ammonification, reduced nitrification, and had little effect on nodule formation, germination or growth. Toxaphene stimulated ammonification and nitrification, reduced nodule formation and germination and caused root abnormalities.

2896. Bhattacharjya, S. S., and Linskens, H. F.
Über den Einfluss von "Systox", "Metasystox" und "Pestox" auf die Kerne und Chromosomen von *Vicia faba*. **(The influence of systox, metasystox and pestox on the nucleus and chromosomes of *Vicia faba*.)**
Phytopath. Z., 1955, **23**: 233-48, bibl. 15, illus.

Applications of systox, metasystox and pestox at concentrations between 0·001% and 1·0% were given to *Vicia faba* plants. Applications of the insecticidal solutions to plants in soil had less severe effects than to those in water culture. The substances were placed in the following order of phytotoxicity: Systox > Metasystox > Pestox.—Bot. Inst., Univ. Köln.

2897. Metcalf, R. L., and others.
The behaviour of systox-isomers in bean and citrus plants.
J. econ. Ent., 1954, **47**: 1045-55, bibl. 14, illus.

The comparative behaviour of radiotracer preparations of the thiono- and thiol-isomers of systox have been investigated in bean and lemon plants. The isomers are readily absorbed by the roots and stems of lemon seedlings and translocated to the leaves in amounts toxic to citrus red mite and greenhouse thrips. In the bean plants 80 to 90% of the total radioactivity in the leaves was in metabolized forms within 24 hours. Metabolism was slightly slower in lemon plants, but 97 to 100% of the total radioactivity was in metabolized forms within 4 days. [From authors' summary.]—Calif. Citrus Exp. Stat., Riverside.

2898. Srivastava, H. C., and Mathur, P. B.
Cold storage of field beans (*Dolichos lablab*).
Indian J. Hort., 1954, **11**: 125-8, bibl. 4.

Beans in pod and fresh bean seeds were stored at temperatures between 32° F. and 88° F. The optimum storage conditions for both pods and seeds were 32–35° F. and 85–90% R.H. The approximate storage life for beans in pods was 21 days, and for bean seeds 7 days. The rate of respiration of beans became slower at lower temperatures.—Central Food tech. Res. Inst., Mysore.

2899. Rohe, O. L., MacGillivray, J. H., and Holland, A. H.
Advantages of self-propelled viners for green lima beans.
Veg. Crop Ser. Univ. Calif. **69**, 1954, pp. 4.

Harvesting costs for delivery of beans to stationary and to self-propelled viners are compared.

Mushrooms.

(*See also* 2992o.)

2900. Ministry of Agriculture, London.
Mushroom growing.
Bull. Minist. Agric. Lond. **34**, 6th edition 1954, pp. 79, bibl. 125, illus., H.M.S.O., Atlantic House, Holborn Viaduct, London, 5s., 5s. 3d. post free.

This is the third important publication on the cultivation of mushrooms in the U.K. within two years. Its sponsors are the glasshouse group of the N.A.A.S. and other experts in the Ministry. So much work has been done of late years that mushroom growing is no longer the chancy business that it once was, nor is it, it would appear, a potential gold mine. Full and clear information is given on modern methods for both indoor and outdoor cultivation, on preparation for market, on pests and diseases and on substitutes for horse manure. Notes on tray cultures are included. It is noted that the Ministry's mushroom work recently carried on at Yaxley will in future form part of the scientific programme of the Glasshouse Crops Research Institute, Littlehampton, Sussex. A very good crown's worth. D.A.

2901. Mushroom Research Association Ltd.
Final Report of the Mushroom Research Station, Yaxley, Peterborough, 1954, pp. 35, illus., 5s.

The Yaxley Station closed down on 30 September, 1954, and mushroom research is to continue at the new Glasshouse Crops Research Institute at Littlehampton, Sussex. Cropping experiments [see separate abstract] and the work of the Chemistry and Microbiology Departments are reported.

2902. Lohwag, K.
Die Pilze in der Ernährung. **(Fungi in human nutrition.)**
Reprinted from *Österr. Zentralorg. Lebensmittel Ernähr.*, 1954, **7** (9): 10-11, bibl. 6.

The nutritional value of edible fungi is discussed with special reference to protein and vitamin contents.

2903. Kinoshita, K.
Mushroom growing in Japan.
Bull. Mushroom Grs' Ass., 1955, No. 63, p. 516.

Commercial production began in the late 1920s and amounted to about 50 tons in 1953. Yields in the first year are about 1·2 lb. per sq. ft. of bed. Production costs are high.

2904. Edwards, R. L.
Cropping experiments.
Final Rep. Mushroom Res. Stat., Yaxley, Peterborough, 1954, pp. 18-23.

The results of experiments are reported on sand/sphagnum peat and sphagnum peat/sand/vermiculite casing mixtures of different depths and with different watering treatments, and on evaporation from casing soil.

Onions and related crops.

(*See also* 2992s, 2993d.)

2905. Ayyangar, R. S.
Cultivation of garlic in Mysore.
Mysore agric. J., 1954, **30**: 263-76.

Acreage, ecology, types and varieties, preparation of planting material, rotation in dry culture, dry and irrigated culture, production, pests and diseases, costs and prices.

2906. Sugiyama, T., and others.
Ecological studies on onion varieties.
From abstr. in *Rec. Res. Fac. Agric. Univ. Tokyo*, 1953/54 [issued February, 1955], **IV**, No. 9, being Varietal differences of responses to ecological factors in vegetable crops, 1954, pp. 16-32.

The growth of onion varieties in 5 different climates was compared. The results were: (1) Autumn sowing: Bolting rate was high in the south and very low in the north, high in a spring-sowing variety and low in 2 early varieties. In warmer climates bulb formation took place earlier and varied with variety, but in cool climates there were no varietal differences in date of bulb formation. Early varieties produced better bulbs in warmer climates and later varieties in cooler climates. (2) Spring sowing: Early varieties developed bulbs more rapidly than late varieties under long day/high temperature conditions. A late variety gave the best performance in cooler climates and early varieties in warmer climates. (3) Flower initiation: In early varieties initiation occurred at 5–10° C. and ranged in date from early February in the south to late April in the north.

2907. Atkin, J. D., and Davis, G. N.
Altering onion flowering dates to facilitate hybrid seed production.
Bull. Calif. agric. Exp. Stat. **746**, 1954, pp. 16, bibl. 12, illus.

During 1950–52 the effects of bulb storage temperatures and planting dates were studied with several onion varieties at Davis, California. Flowering was compared and tabulated for 10 named varieties. Early planting and storage at 50° F. resulted in early flowering and greatest seed yields. Late planting resulted in late flowering, fewer seed stalks, fewer flowers per umbel and a smaller seed yield.

2908. Gordon, L. K.
The effect of daylength on the growth and yield of onions. [Russian.]
Agrobiologija, 1955, No. 1, pp. 64-9, bibl. 4, illus.

Results of experiments conducted in 1946–47 and 1949 showed that short-day treatment of onions retards bulb formation. Onion seedlings raised at natural daylength and given short-day (11–12 hours) treatment at the beginning of bulb formation produced much lower yields than the controls. When, however, the short-day treatment was applied before bulb formation, i.e. about 2 weeks before transplanting, bulb formation was retarded only temporarily, root production was increased and greatly increased yields were obtained. The treatment appeared more effective with early than with late varieties.

2909. Comin, D.
New developments in onion production.
Market Grs' J., 1955, **84** (3): 6, 18, illus.

Recent work is reviewed on fertilizer placement, rates and times of fertilizer application, the use of hybrid varieties, weed control, and pest and disease control in onions.

2910. Leiderman, L.
Combate ao trips da cebola com inseticidas orgânicos. **(Control of onion thrips with organic insecticides.)**
Biológico, 1954, **20**: 196-201, bibl. 8.

Parathion and 7 chlorinated hydrocarbon insecticides were compared as sprays and dusts for the control of onion thrips (*Thrips tabaci*) in field tests at Campinas in 1954, 3 applications at fortnightly intervals in July/August being made in each case. Effective control for 2 weeks after completion of treatment was obtained with sprays of 0·06% dieldrin, 0·18% chlordane and 0·03% parathion and with dusts of 10% chlordane, 1% parathion and 10% DDT. It is recommended that applications should be made at intervals of 7–10 days beginning as soon as the thrips appear.

2911. Georghiou, G. P.
Onion thrips, a minute pest of onions.
Countryman, Nicosia, 1955, **9** (2): 17-18.

One year's trials on onion thrips control showed that dieldrin, parathion and DDT give adequate protection for 4, 3 and 2 weeks respectively. Spraying with 40% nicotine sulphate is recommended if treatment is required a few weeks before harvest.

2912. Heddergott, H., and Pauck, P.
Zur Biologie und Bekämpfung der Zwiebelfliege. **(On biology and control of the onion fly.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1955, **7**: 37-42, bibl. 11, illus.

In Westphalia *Phorbia antiqua* causes severe losses of both onions and leeks. Two methods of soil treatment and one method of seed treatment proved to be successful for control of the pest on a commercial scale: (1) A drilling machine applying chlordane dust (5 g./m.) was followed by a second machine which dropped the seed into the pre-treated furrow. (2) Chlordane dust was applied to rows of seedling plants by a drilling machine at the rate of 100 kg./hectare where the distance between rows was 25 cm. (3) Seed was pelleted with 90% dieldrin dust at the rate of 100 g./1 kg. seed. The biology of the fly is discussed and the cost of treatment is specified for each method.—Pflanzenschutzamt Münster/Westfalen.

2913. Nolte, H.-W.
Die Bekämpfung der Zwiebelfliege durch Saatgutinkrustierung. **(Control of onion fly by seed pelleting.)**
NachrBl. dtsch. PflSchDienst, Berlin, 1955, **9**: 55-8, bibl. 22, illus.

A historical survey is given of experience with seed pelleting for the control of onion fly (*Hylemyia antiqua*). In the author's experiments on pelleting with Spritzgesarol and Spritzgesarol 50, treatment resulted in a considerable reduction in the percentage of infection and in the number of plants destroyed. The recommended rate of application is 300–400 g. of Spritzgesarol 50 per 1 kg. of onion seed. Better control is obtained at the higher concentration, but germination is somewhat inhibited.—Inst. für Phytopath., Aschersleben.

2914. Fjelddalen, J., and Daviknes, T. B.
En orientering om resultatene av forsøk i 1954 med nyere insektmidler mot løkflue. **(A survey of results obtained in 1954 with synthetic insecticides against onion fly.)**
Gartneryrket, 1955, **45**: 159-60.

Pending further tests both seed disinfection with DDT or dieldrin wettable powder (25%) and the dipping of onion sets in chlordane, dieldrin or lindane are recommended for onion fly control. [See also *H.A.*, 24: 2759.]

2915. Comin, D.
New methods in onion handling and storage.
Market Grs' J., 1955, **84** (4): 18-19, 32-3, illus.

Notes are given on modern methods of bulk storage, curing, storage structures, machinery and the use of maleic hydrazide for onions.

Root crops.

(*See also* 2331, 2365, 2411w, 2992 l, p.)

2916. El-Shishiny, E. D. H.
Absorption and assimilation of inorganic nitrogen from different sources by storage root-tissue.
J. exp. Bot., 1955, **6**: 6-16, bibl. 33.

Storage root-tissues of sweet potato tubers, radish and carrot roots were cultured in nitrogenous solutions, and studies carried out on the rate of ammonium and nitrate absorption, and on the effect of the source of N on the nitrogenous composition of the tissue. Both ions were absorbed at more or less equal rates under the experimental conditions by cells of the materials used. In all tissues examined the rate of nitrate N assimilation was lower than absorption. In carrot root ammonium N was absorbed almost as soon as it entered the cell; ammonium N assimilation in radish cells was much less than absorption. Carrot tissues were adapted to the utilization of more ammonium than nitrate N, while radish used more nitrate than ammonium N. Ammonium and nitrate N caused similar increases in the complex organic N level in radish, while in carrot the rate of synthesis was higher with ammonium N. Changes in the amide and amino N content of radish were negligible with both sources of N, while carrot showed marked increases in the 2 fractions.—Alexandria Univ., Egypt.

2917. Philipp, F.
Ergebnisse der Treibgemüsesortenversuche 1954. **(Results of trials with varieties of forced vegetables.)** [English, French, Spanish summaries about $\frac{2}{3}$ p. each.]
Mitt. Klosterneuburg, Ser. B, 1955, **5**: 57-75.

Varieties of the following forced vegetables were tested for the official Austrian register [see *H.A.*, 21: 511 and 513]: kohlrabi, carrots, radish and lettuce.

2918. Keen, G. I.
Carrot-growing in the East Riding of Yorkshire.
Agriculture, Lond., 1955, **62**: 82-5.

An account is given of the highly mechanized methods of production used in the carrot-growing industry which has grown up on the sand lands of the E. Riding during the last half-century.

2919. Gagnebin, F.
Importance de la densité du semis sur les poids des racines de carottes nantaises. **(The importance of sowing rate on the weight of carrot roots.)**
Rev. hort. suisse, 1955, **28**: 81-2.

Carrots, half-long Nantes, were sown on 2 plots covering 65 m.^{2}; seed density in plot A was 70% that of plot B before thinning. On plot A 1,176 roots were harvested, representing 6% of the seeds sown; the roots were of a commercial size and the average weight of 100 roots was 5·4 kg. Carrots harvested from plot B numbered 2,795, representing 10% of the seeds sown; the average weight of 100 roots was 4·1 kg., and many of the roots were too small to be of commercial value.—Univ. Genève.

2920. Wolf, E.
Einfluss der Wachstumsdauer und steigender Nährstoffgaben auf den Karotin- und Vitamin-C-Gehalt von Möhren und Sellerie. **(The effect of duration of growth and increasing nutrient applications on the carotene and vitamin C content of carrots and celeriac.)**
Landw. Forschung, 1955, **7**: 139-43, bibl. 20.

Increasing fertilizer doses were applied to carrot and celeriac plants in field and pot experiments. A suitable complete fertilizer (1 : 1 : 1·7) had a more favourable effect on the vitamin content of carrots than the application of one fertilizer nutrient only. Nitrogen manuring raised the carotene content of carrots, and K manuring increased the vitamin C content of both carrots and celeriac. The best results from phosphoric acid manuring were obtained at medium doses. The relative lowering of carotene content by unbalanced high K manuring, as well as that of vitamin C content by unbalanced high N manuring, was most marked in the assimilating organs and was small in the roots and tubers. During growth the carotene content of carrot roots increased with a decrease in leaf carotene. The vitamin C content of carrot roots and of carrot and celeriac leaves declined in the autumn, while that of the celeriac tubers continued to increase.—Inst. Agrik. chemie, München.

2921. YAMAGUCHI, M., HOWARD, F. D., AND McNELLY, L. B.
Observations on bitterness of California grown carrots.
Plant Dis. Reptr, 1955, **39**: 302-4.

Certain lots of Red Core Chantenay carrots developed a bitter flavour when stored for 6 to 12 weeks at 32° F. The bitterness, which differed from that caused by carrot yellows virus, could not be traced to the effects of fertilizers, irrigation or insecticides. The chemical composition of the bitter carrots was similar to that of normal carrots except that the alpha carotene content was much lower than usual. It is suggested that bitterness may be caused by metabolic products of the carotenoids.—Dep. Veg. Crops, Univ. Calif., Davis.

2922. GUNTHART, E.
Possibilités de lutte contre la mouche du chou et contre la mouche de la carotte. **(The possibilities of controlling cabbage and carrot flies.)**
Rev. hort. suisse, 1955, **28**: 154-8, illus.

Among products tested for the control of cabbage root fly (*Hylemyia brassicae*), those based on aldrin gave the most satisfactory protection, followed by parathion substances. The latter were not so effective in the case of late attacks. The recommended mode of treatment on a small scale is to spray the neck of the plant with 0·1% Octamul A (aldrin) or 0·15% Aralo (parathion) 2–4 days after planting. On a field scale, dusting with Alaterre (aldrin) at 25 kg./ha. is recommended. Sprays of Octamul A (0·1%) and Aralo (0·15%) also controlled caterpillars and aphids: 2–3 applications were necessary at 2–3 weeks intervals, starting immediately after planting out. The same insecticides were effective against carrot fly (*Psila rosae*), and excellent protection was obtained with 0·1% Octamul A applications to plants 5–10 cm. high. The residual effects of aldrin in carrots for consumption may be too high, hence Aralo at 0·15% is recommended for control at present. —Maison Dr R. Maag S.A., Dielsdorf.

2923. STOKES, G. W.
Seed development and failure in horse-radish.
J. Hered., 1955, **46**: 15-21, bibl. 6, illus.

A histological study of seed development and failure in horseradish is reported. Fertilization occurs between 18 and 30 hours after cross-pollination. About ⅓ of the ovules per ovary are fertilized. Lack of seed set is due to abortive ovules and failure of fertilization. Seed failure is due to endosperm-maternal tissue incompatibility and embryo mortality. [From author's summary.]—Univ. Kentucky.

2924. EGUCHI, T., KATO, T., AND WATANABE, S.
Studies on physiological sterility in Japanese radishes. I. Effects of vernalization on bolting, flowering and fruiting. [Japanese, with English summary ½ p.]
EGUCHI, T., AND SHIBASAKI, O.
Idem. II. On floral development in plants from late-sown, unvernalized seeds. [Japanese, with English summary ½ p.]
Bull. nat. Inst. agric. Sci. Hiratsuka (*Ser. E*) **3**, 1954, pp. 113-26, bibl. 73, illus., and pp. 127-38, bibl. 13, illus.

In 2 Japanese radish varieties bolting, flowering and fruiting were (1) normal when unvernalized seed was sown in March but progressively less so with progressively later sowing; (2) normal when vernalized seed (5° C. for 15 days) was sown in April or May but not when it was sown in June. The abnormal floral development is described. Abortion and proliferation occurred.

2925. SMITH, A. M., AND ANDERSON, G.
The relationship between the boron contents of soils and swede roots.
J. Sci. Food Agric., 1955, **6**: 157-61.

Investigations on soil boron during the past twenty years have shown that the total boron content of soils bears no relation to the incidence of boron-deficiency symptoms in crops grown on these soils, and attempts have been made to find a method of extraction which will give a measure of the amount of boron available to the plant. Laboratory and field experiments in 1949/51 are described. By boiling a 1: 2 suspension of soil in water under reflux for 15 minutes, a quantity of boron was extracted which gave a good index of the amount available to plants. If this "available" boron fell below 0·7–1·0 p.p.m. of air-dried soil, raan (brown heart) was liable to occur in swedes grown in the area. Dressings to the soil of up to 30 lb. of borax per acre increased the available boron by substantial amounts. The boron content of the swedes cropped was also raised considerably and the incidence of raan lowered, and no toxic effects of borax treatment were noted. There was no effect on yield of roots and only a little on dry-matter content. An application of limestone to a heavy soil, bringing the pH up to 8·1, caused only negligible symptoms of raan in a swede crop and did not appear to fix any of the applied boron. [Authors' summary.]—Edinburgh and E. of Scotland Coll. Agric.

2926. THORNE, G. N.
Interactions of nitrogen, phosphorus, and potassium supplied in leaf sprays or in fertilizer added to the soil.
J. exp. Bot., 1955, **6**: 20-42, bibl. 5.

The total P content of swedes in a pot experiment was doubled by fertilizer applications, and more than trebled by spray applications. Dry weight was increased only by the fertilizer. The distribution of dry weight between tops and roots was unaffected by the treatments, but the percentage of the total P content occurring in the tops was increased by spraying treatments and reduced by ordinary fertilizer applications. Further experiments were carried out on sugar beet.—Rothamsted exp. Stat., Herts.

2927. Šuput, M.
The effect of soil moisture on germination and growth of sowings of soyabean, vetch, sunflower, flax, hemp and turnip. [Serbian, with French summary ¾ p.]
Rev. Res. Work Fac. Agric. Belgrade, 1954, **2** (1): 68-80, bibl. 16.

The minimum soil moisture content for satisfactory germination and early growth of hemp and turnip was 20–25% of field capacity. Optimal germination occurred at 35–45% and 40–45% respectively and best emergence and early growth at 45% for both crops. At saturation point the seeds did not germinate.

2928. Scheiding, U.
Beitrag zur Biologie und Bekämpfung des Kohlgallenrüsslers *Ceuthorrhynchus pleurostigma* Marcham. (**Biology and control of the turnip gall weevil.**) [Summaries in Russian, English and French ½ p. each.]
Kühn-Arch., 1954, **68**: 333-7, bibl. 69, illus.

The biology, economic importance and control of the turnip gall weevil are discussed mainly in relation to rape, but the response of cabbage roots to the pest is also described and illustrated. Soil treatment with BHC and watering with BHC after emergence are recommended for control.—Martin-Luther-Univ., Halle-Wittenberg.

Salad crops.

(*See also* 2373, 2389, 2398, 2532, 2992g, j, 2993h.)

2929. Gouny, P.
Mobilisation des réserves chez l'endive. (**The mobilization of reserve materials in chicory.**)
Ann. agron., 1954, **5**: 725.

The exposure of chicory roots to +2° C. for 14 days accelerated the hydrolysis of inulin and thereby increased the percentage of soluble sugars from 10·3% in the controls to 40·5% of total sugars. Cold treatment of the roots is recommended for chicory forcing on the Côte d'Azur.—Antibes.

2930. Boulay, H.
La culture et l'état sanitaire de la laitue d'hiver dans les Pyrénées-Orientales. (**Culture and health of winter lettuce in the Eastern Pyrenees.**)
Rev. hort. Paris, 1954, **126**: 1165-70, and 1955, **127**: 1202-3, 1206, bibl. 15, illus.

Winter lettuce is the backbone of market gardening in Rousillon, with Trocadero being almost the only variety grown. Yields are generally low owing to the unsatisfactory physiological condition of the plants, to which the intensive culture and growing methods are contributory causes. The author considers that improvements in pest and disease control and cultural conditions, together with plant selection and breeding would improve lettuce production in this area.

2931. Gillow, J. G.
Glasshouse lettuce in Hesketh Bank.
Agriculture, Lond., 1955, **61**: 581-5.

Intensive practices of winter lettuce production in the Hesketh Bank area, Lancashire, are discussed, where over 60 acres of glasshouse space are given over to the crop.

2932. Tolba, M. K.
Influence of environmental conditions and seed treatment on the emergence of lettuce seedlings.
Bull. Inst. Égypte, 1952/53 (issued 1954), **35**: 221-37, from abstr. in *Biol. Abstr., Sect. D*, 1955, **29**, No. 6775.

Seed treatment with cuprocide at the rate of 1% of the dry weight of seed gave statistically significant improvement in the percentage of emergence of both Sutton's Imperial and Improved Trocadero seed, in cold, wet soil, where conditions favoured the incidence of pre-emergence damping-off. In warm, dry soil, seed treatment had no beneficial effect, but neither was there any damage. In most of the open-air sowings made during the period of cold, wet weather, Sutton's Imperial gave a significantly higher emergence than Improved Trocadero. Heavy watering immediately on sowing or in the following few days had a deleterious effect on seed emergence, but this was not pronounced when the soil was originally cold and wet.—Fac. Sci., Univ. Cairo.

2933. Luddington (N.A.A.S.).
Glasshouse section.
Rep. Luddington exp. Hort. Stat. for 1953, 1954, pp. 44-8.

Lettuce spacing in heated glasshouse: closer spacing produced smaller plants and more waste than wider spacing, but gave a more profitable return. The highest profit was obtained for a reasonable cost per plant at a spacing of 6 in. by 6 in. *Tomato spacing under twin and single cordon systems:* single cordon plants spaced at 14 in. by 18 in. appeared to be superior to twin cordon plants in ease of management, health, earliness and yield.

2934. Harding, C. F., and David, J. J.
The effect of certain mineral nutrients on the ascorbic content of leaf lettuce.
Food Res., 1954, **19**: 138-45, from abstr. in *Food Sci. Abstr.*, 1955, **27**, No. 307.

Sand and solution culture experiments on Grand Rapids lettuce showed that mineral nutrition had some effect on the ascorbic acid content of leaf lettuce, but this effect was insufficient to account for the wide variations in the concentration of ascorbic acid observed in the plants. Nitrogen caused most variation; in general, increased N and P caused an increase in the ascorbic acid content, whereas increased K caused a decrease. The balance between the levels of the 3 elements (particularly P and K) was as important as the actual amount of any one nutrient.

2935. Kúthy, S., and others.
Permetező trágyázás hatása salátára és borsóra. (**The effect of foliar nutrition on lettuce and peas.**) [Russian and German summaries.]
Agrokém. Buda., 1954, **3**: 189-96, bibl. 16.

Spray applications of 3% NPK and N solutions to 1-month-old greenhouse-grown lettuce plants increased the fresh and dry weights and organic content 10 days later by 10–25% compared with the controls. Outdoor-grown peas sprayed with 4% PK solution during flowering yielded 10% more than the controls. A 4% NPK solution applied at the same time either did not increase or slightly depressed yield. Sprays applied in the green ripe stage either to the foliage or to the soil were ineffective.

2936. FRIEDMAN, B. A.
Brown spot complex of head lettuce on eastern markets.
Plant Dis. Reptr, 1954, **38**: 847-51, bibl. 28, illus.

Brown spot of head lettuce found in eastern markets is apparently a complex. The breakdown is probably physiological and may develop in response to a number of different adverse conditions in the field or in transit or storage. The symptoms resemble those of previously described lettuce diseases, especially russet, brown blight, spotted wilt, rib blight, redheart and internal breakdown. While there is some similarity of the brown spot complex to tipburn, it is believed that these disorders are not the same since they apparently develop in response to different environmental conditions. [From author's abstract.]—Biol. Sci. Branch, U.S. Dep. Agric., New York.

2937. ZINK, F. W., AND GROGAN, R. G.
Big vein of lettuce.
Calif. Agric., 1955, **9** (2): 8.

A study was made of the effect of big vein disease on the yield of marketable lettuce, using 10 commercial Great Lakes lettuce fields with various percentages of big vein. Disregarding market conditions it appeared that 87% of the total healthy population was cut in all trials, while only 48% of the total big vein population was harvested. Cuts were heaviest in predominantly healthy fields. In predominantly diseased fields the percentage of healthy plants in the first cutting was unusually high. In these fields there were low cuts during poor market periods and high cuts in good periods.

2938. HANNON, C. I.
Lettuce root rot in New York State.
From abstr. in *Phytopathology*, 1955, **45**: 184.

A disease similar to lettuce stunt, reported 30 years ago but not subsequently, has caused 5–40% losses during the last few seasons in many lettuce crops grown on muck in New York. *Pythium* and other fungi were recovered from infected plants and the symptoms, progress, ecology and varietal incidence of the disease are discussed.

2939. BELL, H. S.
Peat pots to control botrytis in lettuce.
Grower, 1955, **43**: 885.

Botrytis losses were nil in frame-grown plants which had been pricked out into peat pots. Handling of the plants at planting out was not necessary when these pots were used.

2940. SMITH, F. J., AND ENOCHIAN, R. V.
Costs of field packing lettuce.
Calif. Agric., 1955, **9** (3): 2, 14.

Whereas in 1952 only 20% of the lettuce shipped from the Salinas area of California was field-packed in cartons and then vacuum cooled, by 1954 73% of the crop was being handled in this way. Various procedures using different equipment have been evolved for field-packing. The present paper describes the 3 methods most commonly used and sets out the costs of each for 4 densities of crop ranging from 100 to 250 cartons per acre.

Spinach.

2941. SMITH, W. L., Jr.
Streptomycin sulfate for the reduction of bacterial soft rot of packaged spinach.
Phytopathology, 1955, **45**: 88-90, bibl. 13.

The effectiveness of streptomycin in reducing post-harvest bacterial soft rot [*Erwinia carotovora* and *E. atroseptica*] of spinach leaves packaged in plastic bags was tested. Streptomycin in pre-harvest or post-harvest dips reduced decay so that the treated leaves showed virtually no decay after 2 days at 70° F. The amount of decay in them after 3 days was less or the same as in the controls after 2 days. Post-harvest dips in streptomycin solutions gave slightly better decay control than the pre-harvest sprays. Bacterial decay progressed rapidly in the spinach not treated with streptomycin and within 2 days a relatively high percentage of the leaves were invaded. In 3 days the leaves were entirely decomposed. Both treated and non-treated spinach held for 1 week at 32° decayed more rapidly when transferred to 70° than similar lots of spinach that were not previously held at the low temperature. [Author's summary.]—U.S. Dep. Agric., Beltsville, Maryland.

2942. DEZEEUW, D. J.
Fungicide treatment of table beet and spinach seeds for the prevention of damping-off.
Quart. Bull. Mich. agric. Exp. Stat., 1954, **37**: 105-18, bibl. 15, illus.

A report is made on experiments and screening tests with 45 seed treatment fungicides for the control of damping-off of table beets and spinach between 1948 and 1953. On the basis of these trials, Phygon (50% active) or Arasan (75% active) at 8 oz./100 lb., either dry or as a slurry, are recommended as satisfactory for both crops. Yellow Cuprocide at 8 oz./100 lb. was slightly better than these 2 materials for treatment of spinach seed but was less effective for beet. Panogen, Panogen-S, Orthocide (75), Orthocide Seed Guard, duPont I and D, Merculine and Fermuline were also promising but require further testing. Acti-dione was toxic to beet seeds at strengths of from 1 to 4% and was ineffective as seed protectant at all strengths. Storage of treated seed was not detrimental to germination.

Tomatoes, capsicums and others.

(*See also* 2334, 2352, 2372, 2374, 2376, 2475, 2841, 2992d-f, i, q, r, u, w, 2993a, 3244.)

2943. KRYŽANOVSKIĬ, F. D.
Intergeneric hybridization of Solanaceae. [Russian.]
Priroda, 1955, **44** (1): 55-60, bibl. 1, illus.

Cross pollination between tomato and tree tomato, *Cyphomandra betaceae*, was unsuccessful but vegetative hybridization by grafting gave very good results. Various tomato species and varieties were grafted on *Cyphomandra* and already in the first graft generation (A_1) and its seedling progeny some morphological, physiological and biochemical changes have been observed [see also *H.A.*, 23: 3153]. When the tomato variety Bizon was grafted on *Cyphomandra* and its seedling progeny re-grafted on the same rootstocks a new type of tomato was obtained from the third graft generation. It is called "Vegetative hybrid No. 1", is characterized by strong, rugose leaves which are more like the leaves of *Cyphomandra* than those of tomato, is virus resistant and in the greenhouse it crops for 3 years. Its fruits are large with a high sugar content and good keeping quality.

2944. Böhme, H.
Untersuchungen zum Problem der genetischen Bedeutung von Pfropfungen zwischen genotypisch verschiedenen Pflanzen. (**Studies on the genetical significance of graft hybrids between plants differing genotypically.**)
Kühn-Arch., 1954, **68**: 358-9.*

In his 1,063 grafts carried out with 7 tomato varieties in 20 combinations, the author did not find any laws governing vegetative hybridization as postulated by Russian workers, although he used identical methods and similar varieties. Some of the results obtained point to the possibility that grafting may affect number of locules and fruit shape—the incidence of such cases was too small to be significant—and, under very special conditions, fruit colour.—Martin-Luther-Univ., Halle-Wittenberg.

2945. Brežnev, D. D., and Aĭzenštat, Ja. S.
Variability of hybrid tomatoes, raised in different natural-climatic regions. [Russian.]
Agrobiologija, 1955, No. 1, pp. 46-54, bibl. 4.

Tabulated data show that the fruits of F_1 and F_2 tomato hybrid seedlings grown in the north, i.e. at Puškin, Leningrad area, have more loculi, a lower index number (height: width ratio), lower dry matter, lower sugar and acid contents, but higher vitamin C content than those grown in the south at Maikop, Krasnodar region or in Taškent, Central Asia. Tomatoes grown under irrigation in Central Asia did not differ from those grown in the north quite so much as did those grown under dry land conditions.

2946. Podešva, J.
Výsledky pokusů s využitím heterose u rajčat pro rychlírny i polní pěstění. (**Results of experiments on the use of heterosis with tomatoes for forcing and field growing.**) [English and Russian summaries 8 and 10 lines respectively.]
Acta Univ. Agric. Silvic. Brno, Ser. A, 1954, No. 2, pp. 11-18, bibl. 5.

In experiments at Lednice [Eisgrub] on the crossing of tomatoes for heterosis, the parental combination B_{II} (called Ostravské varieties—parents Mikado, Bonner Beste and *Solanum racemigerum*—early with resistance to *Cladosporium*) × NN_{55} (Vrbičanské varieties, semi-determinate, very early) was found to be the best for glasshouse production. Other crosses with B_{II} as either male or female parent also showed improved earliness and good yields. For field production the hybrid Break O'Day × Prince Borghese was found to be the most suitable.

2947. Zonić, I., and Dumanović, J.
Heterosis of yield in crosses of F_1 generation of tomatoes (*Lyc. esculentum*). [Serbian, with English summary 1½ p.]
Rev. Res. Work Fac. Agric. Belgrade, 1954, **2** (2): 145-57, bibl. 8, illus.

The possibility of using hybrid vigour for increasing tomato production was investigated at Zemun. Out of 12 F_1 hybrids, 10 showed yield increases when compared with their more productive parent. The majority of hybrids were earlier than their parents.

2948. Vasić, A., and Niketić, G.
A contribution to the knowledge of the technological value of some tomato varieties. [Serbian, with German summary 1 p.]
Rev. Res. Work Fac. Agric. Belgrade, 1954, **2** (2): 184-95, bibl. 10.

Brief morphological descriptions and tabulated results of mechanical and chemical analyses of 26 tomato varieties.

2949. Persson, A. R., and Langvad, B.
Sortimentsgransking i veksthustomat. Observasjoner i samband med foredling. (**Varietal research on glasshouse tomatoes. Observations on breeding.**)
Gartneryrket, 1955, **45**: 180-1, 203-4, 221-2, 248, 253, bibl. 14, illus.

The characteristics of 18 glasshouse tomato varieties are discussed on the basis of trials carried out mainly at the Institute for Vegetable Growing of the Norwegian College of Agriculture. For breeding purposes special attention is drawn to Single Cross and Immuna, the latter being a leaf-mould resistant variety which yielded 13 kg./m.² in cold house trials.

2950. Campbell, J. A.
Manalucie, Kopiah tomatoes lead in variety testing.
Miss. Fm Res., 1954, **17** (12): 5, illus.

In comparative tests with 5 commercial tomato varieties in Mississippi, the new variety Manalucie gave by far the highest yields. It has a high degree of resistance to fusarium wilt. The next highest yield was given by Kopiah, which is also wilt-resistant. After 24 days' storage at 65° F. and 85% R.H., 70% Kopiah fruits were in sound condition whereas only 25% Rutgers fruits were sound. Kopiah showed less loss of weight and better ripe colour after storage than Rutgers.

2951. Castronovo, A., and Avila, A.
El método refractométrico y la selección de variedades industriales de tomate. (**The refractometric method and the selection of processing tomato varieties.**)
Rev. Invest. agríc. B. Aires, 1953, **7**: 5-23, bibl. 25.

Investigations at the Institute of Plant Science showed that the hand refractometer is well suited to the rapid determination of the dry matter content of tomatoes.

2952. Böszörményi, Z.
Data on the morphogenesis of tomato fruit. (Adatok a paradicsomtermés morfogenezishez.) **II.**
Ann. biol. Univ. Hung., 1952, **2**: 193-9, from abstr. in *Hung. agric. Rev.*, 1954, **3** (4): 6.

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* Summary of a thesis.

In the course of the tests outlined it was found that varieties producing small fruits and few loculi more nearly reached final fruit-size on the 11th–13th day of development than those which produce many loculi. A positive correlation was established between fruit size and number of seeds. A similar relationship was also revealed between the size of epidermal cells and the number of seeds. The division of epidermal cells of tomato fruits goes on longer than that of the pericarp cells.

2953. ANON.
Wortelontwikkeling bij tomaten. **(Root development of tomatoes.)**
Jversl. Proefst. Groent. Fruit. Glas, Naaldwijk, 1954, pp. 33-4.

Root studies on young tomato plants showed that the average root growth for 2 weeks after planting was 23 mm. per day. Root growth slowed down and stopped within 4 weeks of planting while the aerial portion of the plant continued to develop. After harvesting root growth started again.

2954. ŠUIN, K. A.
Pre-sowing treatment of tomato seeds. [Russian.]
Sad i Ogorod, 1955, No. 2, pp. 34-5.

Swelling but not yet germinating tomato seeds were given daily alternating temperature treatments at 0° and 15° C., 0° and 30° C., 0° and 45° C., and −3° and 15° C. for 15 days, and also constant temperature treatments at 0° and −3° C. before sowing. The constant temperature treatment at −3° C. for 5 days was the most effective and simplest, resulting in rapid germination followed by vigorous growth, high yields and early ripening.

2955. ABRAMO, S.
La nuova tecnica per la produzione del pomodoro precoce da tavola nella zona di Milazzo. **(The new method of producing early eating tomatoes in the Milazzo district [of Sicily].)**
Riv. Ortoflorofruttic. ital., 1955, **39**: 51-67, illus.

The author's method involves (1) elimination of gapping up by planting out 2 months later than normal; (2) topping at the second truss and single-stem culture; (3) increasing planting density to more than double the normal; (4) succession-cropping after the early tomato crop. The varieties used include Best of All, Improved Export and Nunhem's Tuchqueen. The recommended spacing is 20×65 cm. The yield of large-size fruit is greater than that under normal culture. The results are given of a comparison of the new and the normal methods with topping at different trusses made in 1954.

2956. ROY, R. S., SINGH, R. K., AND BARI, M. F.
Effect of spacing on the growth and fruiting of tomato variety Marglobe Sabour.
Indian J. Hort., 1954, **11**: 131-7, bibl. 3.

Tomatoes, Marglobe Sabour, were grown at 3 spacings during 4 seasons. Highest yields per acre were produced by the 4×2 ft spacing. Yields per plant were highest at 4×4 ft, and lowest at 4×2 ft. Increased spacings resulted in a slight increase of weight per fruit and number of fruits per plant.—Hort. Res. Stat., Sabour, Bihar.

2957. HALSEY, L. H., AND JAMISON, F. S.
Turning and mature-green yields of several tomato varieties from staked and unstaked plants.
Proc. Fla St. hort. Soc. for 1954, pp. 142-5, bibl. 7.

In general, staking resulted in increased yields of marketable fruit compared with no staking, and higher marketable yields were obtained from a mature-green harvest than from a turning harvest. There was, however, considerable varietal variation within these results. The highest amount of fruit cracking resulted from harvesting turning tomatoes from staked plants. All varieties, except Manalucie, gave the same or lower yields when harvested turning from staked plants than when harvested mature-green from unstaked plants.

2958. OLSEN, P. G., AND ANDERSEN, P.
Forsøg med gødskning til tomater på dampet jord. **(Manurial trials with tomatoes grown in steam-sterilized soil.)**
Årbog Gartneri 1954, 1955, **36**: 158-68.

The soil used was so fertile that nitrogen manuring produced little response. The content of available manganese in the soil increased considerably as a result of steam sterilization and it remained above the deficiency level throughout the experiment. Ammonia was highest immediately after sterilization when some nitrite was also present in the soil. A month later all nitrite had disappeared. There was no evidence of plant injury.

2959. BADAWI, A. M. M.
Effect of mineral nutrition on bud growth in tomato.
Diss. Abstr., 1955, **15**: 194-5, being *Publ.* 10405, of 158 pp.

The relationship of mineral element variations to bud growth was studied in Bonny Best tomatoes. Seedlings were transplanted to nutrient media and later decapitated. Growth measurements were taken. High P gave the best growth of callus tissue and the highest percentage of bud/stem area. A control solution (Shive's) resulted in the best growth of the first leaf of the axillary bud, and the shortest time for the appearance of adventitious buds. High K gave the best area of both stem and bud. Element deficiencies caused reduced growth and death in comparison with the control solutions. In variability experiments, a N concentration of 156·8 p.p.m. was the optimum for all growth measurements. Callus formation and leaf growth were best at the 176 p.p.m. level of K and the 120 p.p.m. level of P. Bud and stem area was best at the 44 p.p.m. K level and 80 p.p.m. P level. Adventitious buds appeared in the shortest time at the 44 p.p.m. K level and the 120 p.p.m. P level.

2960. GERALDSON, C. M., SPENCER, E. L., AND JORGENSEN, M. C.
Chemical analysis as a tool in determining nutritional factors affecting tomato quality.
Proc. Fla St. hort. Soc. for 1954, pp. 123-7, bibl. 5.

Plant tissue and soil tests were used in an attempt to correlate tomato quality with nutrition. Calcium deficiency, which was prevalent, was associated with fruit softness, and with the occurrence and severity of blossom end rot. Plant tissue analyses proved to be most valuable as an indication of Ca, N and K deficiencies. The more valuable diagnostic soil tests included pH, total soluble salts and Ca availability.

2961. MICHNIEWICZ, M.
Wpływ różnych koncentracji soli kwasu fosforowego na bilans wodny i obniżenie skutków suszy u pomidorów. **(The effect of different phosphate concentrations on the water balance and drought resistance of tomatoes.)** [English and Russian summaries $1\frac{3}{4}$ p. each.]
Roczn. Nauk rol. Ser. A, 1954, **69**: 167-88, bibl. 21.

Applications of sodium phosphate to tomato seeds had an unfavourable effect on germination and early growth. Where tomatoes were grown in water or sand cultures it was found that both insufficient and excessive amounts of P deranged the water economy of the plants, resulting in retarded growth, increased transpiration and higher cell sap concentration in the leaf. Correct amounts of P had a favourable effect on water balance and increased drought resistance.

2962. CHABANNES, J., AND BARBIER, G.
Action utile du bore en l'absence de symptômes de carence. **(The beneficial action of boron in the absence of deficiency symptoms.)**
Ann. agron., 1954, **5**: 848-51.

Young tomato plants grown in soilless culture were shown to benefit greatly from slight increases in the boron concentration of the solution and to be inhibited significantly by an excess of the element, without exhibiting any symptoms of either boron deficiency or toxicity.

2963. CARLTON, W. M.
Some effects of zinc deficiency on the anatomy of the tomato.
Bot. Gaz., 1954, **116**: 52-64, bibl. 14, illus.

In Rutgers tomato seedlings low zinc (0·0005 p.p.m.) resulted in reduction of meristematic activity in root tips and cambium (complete cessation with no zinc), in necrosis of leaf tissue, and in the precocious maturation of tissues. Zinc deficiency appeared to have less effect on primary tissues than on secondary growth, which it noticeably retarded.—Dep. Bot., Univ. Georgia, Athens.

2964. JUILLET, A., AND LEVALLOIS, E.
Traitement d'une culture de tomates par les hormones parthénocarpiques. **(Treatment of a tomato crop with parthenocarpic hormones.)**
Commun. sci. IIIe Congr. int. Phytopharm., 1952, Vol. II, being *Phytiatrie-Phytopharm.*, Num. spéc., 1954, pp. 732-3.

Weekly spraying with β-NAA at 400 c.c. per are, beginning when the first flowers appeared, slowed down growth but greatly benefited flowering, fruiting and maturation of tomatoes. The first trusses began to mature 10–15 days earlier than in the controls. Total yields per plant up to mid-July were 1·8 and 2·3 kg. in the treated plots compared with 1·1 in the control. The earlier trusses gave a greater yield and showed a larger fruit size than normal.

2965. KRISHNAMURTHI, S., AND SUBRAMANIAN, D.
Effect of 2,4-D on the fruit-set of the 3rd to 5th clusters of tomato.
Sci. and Cult., 1955, **20**: 399, bibl. 2.

Treatment just before opening with the ammonium salt of 2,4-D (2 p.p.m.) increased fruit set in the 3rd, 4th and 5th truss of glasshouse tomatoes by about 190%.—Annamalai Univ.

2966. DENNISON, R. A., AND HALL, C. B.
Field and greenhouse observations under which vascular-browning (gray wall) of tomatoes occurs.
Proc. Fla St. hort. Soc. for 1954, pp. 133, bibl. 3.

In the field, affected fruits nearly always occur on plants which have made vigorous growth, and are found first where they have been shaded. When there is a high proportion of vascular-browning, both shaded and exposed fruits are affected. The disorder frequently occurs after dull and rainy weather, and has also been observed to be connected with soil compacting. In greenhouse experiments data indicated that low light intensity, excessive moisture, cool night temperature and soil compacting were all associated with the development of vascular-browning.

2967. SCHAEFER, E. E., AND LOEST, F. C.
Spotted wilt or kromnek of tomatoes.
Fmg S. Afr., 1955, **30**: 23, 36, illus.

Control measures recommended for this disease are sowing *in situ*; transplanting as many plants as possible to increase the chance of a good crop; isolation of the field from crops harbouring the virus or its vector; clearing the weeds or dusting them with DDT; dusting young plants with 1% parathion and older plants with $2\frac{1}{2}$% DDT.

2968. PIMENOVA, A. S., AND KAMENSKAJA, A. I.
Increasing the resistance of tomatoes to streak. [Russian.]
Sad i Ogorod, 1955, No. 2, pp. 27-30.

Tests are described showing that applications of schoenite [potassium magnesium sulphate], magnesium sulphate, borax and potassium manganate increased the resistance of frame-grown, well manured tomatoes to streak and improved yields. Of the 4 nutrients borax appeared to have most effect. Early planting of sturdy seedlings contributed to resistance.

2969. CONOVER, R. A.
An evaluation of streptomycin sprays for bacterial spot control in commercial tomato plantbeds.
Proc. Fla St. hort. Soc. for 1954, pp. 105-7.

Many growers used streptomycin sprays to protect young tomato plants from bacterial spot. Excellent control was obtained by starting before the disease was established and spraying at 4- to 5-day intervals. Inferior control was generally due to a delayed start of spraying or to poor coverage. [See also *H.A.*, 25: 675.]

2970. GRAY, R. A.
Inhibition of root growth by streptomycin and reversal of the inhibition by manganese.
Amer. J. Bot., 1955, **42**: 327-31, bibl. 11.

In germination tests 20 p.p.m. streptomycin sulphate caused 50% inhibition in the growth of the roots of tomato seedlings. Similar amounts of streptomycin added to the nutrient solution in which large tomato plants grew greatly inhibited both root and stem growth. On the other hand, 3 sprays containing 10,000 p.p.m. of streptomycin applied to aerial parts of the plants did not affect root growth, although it did reduce stem growth. Manganous ion was found to reverse to some extent the inhibition of root growth caused by streptomycin.

2971. Guillemenet, R., and Tave, J.
Essai comparatif de divers fongicides minéraux et organiques dans la lutte contre l'Alternariose (*Alternaria dauci* (Kühn) Groves et *Skolko-forme solani* (Ell. et Mart.) Neerg. Adelomycètes Dematiaceae) sur tomate pendant la compagne 1953-1954. **(A comparison of certain mineral and organic fungicides for the control of tomato blight in 1953/54.)**
Fruits et Prim., 1954, **24**: 504-17.

Copper oxychloride, zineb, manzate and captan were compared with bordeaux mixture (at 125–375 g. per hl. depending on the age of the crop) for the control of tomato early blight (*Alternaria solani*) in an experiment on the Azemmour coast road in 1953/54. Twenty applications were made between late October and mid-May. The results are discussed under the headings collar rot, leaf spot, percentage fruit infection, fruit malformation, yield and fruit size. Zineb gave the highest yield (49·7 tons per ha. compared with 30 in the control) followed by manzate (47·7) and captan (41·9). Copper oxychloride gave the best fruit size (52·3% grade 1 and 2 fruit compared with 43% in the control) followed by bordeaux mixture (51·5) and captan (50). The organic fungicides gave better control of *Alternaria* than the copper fungicides.

2972. Schmidt, H. A.
Versuche zur Bekämpfung der Phytophthora an Tomaten. **(Control of *Phytophthora* on tomatoes.)**
NachrBl. dtsch. PflSchDienst, Berlin, 1955, **9**: 67-73, bibl. 6.

In the Mecklenburg coastal area, copper spray programmes were tested for the prevention of late blight infection of tomatoes. In 1953 Cupral, Fuklasin and Ceresan were applied to Bonner Beste tomatoes; control by Fuklasin and Ceresan was not satisfactory. The addition of stickers to the sprays did not increase the duration of their protective effect. In 1954 Cupral only was used, being applied to Rheinlands Ruhm, Frühe Liebe and Heinemann's Vortreffliche. Sprays were applied either according to the calendar or to weather conditions. The wet summer complicated results, and no definite effects of the 2 methods were apparent. Results showed that few healthy fruits can be harvested in this moist area, unless copper/lime sprays are applied 3 times at intervals of 2–3 weeks from the beginning of July.

2973. Young, P. A.
Experimental control of southern blight on tomato.
Plant Dis. Reptr, 1954, **38**: 858, bibl. 2.

In tests in 1954 CBP was promising for the control of southern blight (*Sclerotium rolfsii*).—Texas agric. Exp. Stat. and Shell chem. Co.

2974. Darby, J. F.
A progress report on gray mold and ghost spot of tomatoes and their control.
Plant Dis. Reptr, 1955, **39**: 91-7, bibl. 1.

In field trials with 4 fungicides in 1951/54 50% wettable 2,3-dichloro-1,4-naphthoquinone (dichlone) at 3–4% gave the best control of tomato grey mould (*Botrytis cinerea*) and ghost spot (*? B. cinerea*) but was ineffective against grey leaf spot (*Stemphylium solani*). This difficulty was largely overcome by alternating dichlone with zineb, nabam-zinc sulfate, or maneb. Mixtures of dichlone and zineb were found to be promising in the control of all 3 diseases. [From author's summary.] —Central Fla Exp. Stat., Sanford.

2975. Conover, R. A.
Several years comparisons of "good" tomato fungicides.
Proc. Fla St. hort. Soc. for 1954, pp. 127-9.

Yield records were collected during 6 seasons from tomatoes sprayed with zineb and nabam-zinc sulphate. Zineb-sprayed plants yielded an average of 36 crates per acre of marketable fruit and 31 crates per acre of total yield more than those sprayed with nabam-zinc sulphate. Records from 3 seasons showed that tomatoes sprayed with maneb and nabam-magnesium sulphate produced approximately equal yields, which were somewhat higher than those from zineb-sprayed plants. Plants sprayed with nabam-zinc sulphate again produced significantly lower marketable and total yields.

2976. Zähner, H.
Über den Einfluss der Ernährung auf die Toxinempfindlichkeit von Tomatenpflanzen. **(On the influence of nutrition on the susceptibility of tomato plants to toxins.)**
Phytopath. Z., 1955, **23**: 49-88, bibl. 96, illus.

(1) Nutrition governs sensitivity to fusaric acid in the moderately susceptible tomato variety Tuckswood. (2) Highest sensitivity is shown by plants fertilized at a normal rate. Sensitivity is reduced in the case of both deficient and excessive nutrient supplies, the latter as a result of high salt concentration. (3) Nutrition affects the responses of tomatoes to *Fusarium lycopersici* in the same way as it affects their response to toxins. (4) Nitrogen deficiency markedly reduces sensitivity to the toxins tested (fusaric acid, lycomarasmin and iron-lycomarasmin). (5) Phosphoric acid supplies had no significant influence on resistance to toxins. (6) Fusaric acid inhibits respiration and, at higher concentrations, coagulates protoplasts. Neither of these two effects is influenced by N nutrition. (7) At low concentrations and after a short time of action fusaric acid increases the water-permeability of the protoplasm in normally fertilized plants, but in N deficient plants permeability is not affected. It is suggested that this effect on water-permeability is primarily responsible for the incidence of necrosis. [Shortened translation of author's summary.]—Eidg. tech. Hochschule, Zürich.

2977. Linskens, H. F.
Der Einfluss der toxigenen Welke auf die Blattausscheidungen der Tomatenpflanze. **(The effect of toxin-induced wilt on leaf secretions in tomato plants.)**
Phytopath. Z., 1955, **23**: 89-106, bibl. 19, illus.

Lycomarasmin and fusaric acid were shown to increase secretion in wilting tomato leaves. The secretion contained both salt ions (Ca, K, Na) and free amino acids, a fact which supports Gäumann's theory that injury to the membranes of the protoplasm, affecting its permeability, is the primary cause of irreversible, pathological wilting.—Eidg. tech. Hochschule, Zürich.

2978. Gäumann, E., and Naef-Roth, S.
Über die chelierende Wirkung einiger Welketoxine. II. Die Verschiebungen der Toxizität durch steigende Zusätze von Asche aus jungen Tomatensprossen. **(On the chelating action of some wilting toxins. II. Changes in toxicity by increased additions of ash from young tomato shoots.)**
Phytopath. Z., 1955, **23**: 147-60, bibl. 7, illus.

[For abstract of Part I see *H.A.*, 24: 3410.] The addition of tomato ash to lycomarasmin or Komplexon III markedly reduced the toxic action of both substances to young tomato shoots. The identical response of lycomarasmin and Komplexon III to the addition of ash suggests that lycomarasmin is a genuine and effective chelating agent.—Eidg. tech. Hochschule, Zürich.

2979. Gäumann, E., and Naef-Roth, S.
Die Dosis-Effekt-Beziehungen bei Lycomarasmin und Komplexon III. **(The relations between dosage and effect in the case of lycomarasmin and Komplexon III.)**
Phytopath. Z., 1955, **23**: 141-6, bibl. 3.

The different course of the dosage-effect curves of lycomarasmin and Komplexon III (the disodium salt of ethylenediaminetetraacetic acid) indicates that the internal action of the two toxins in young tomato plants coincides only partially. [See also *H.A.*, 24: 3410.]—Eidg. tech. Hochschule, Zürich.

2980. Anderson, L. D.
The tomato russet mite in the United States.
J. econ. Ent., 1954, **47**: 1001-5, bibl. 11.

The tomato russet mite, *Vasates lycopersici*, previously *V. destructor*, is effectively controlled by 75 or 50% sulphur dust in the early stages of fruit development and by 25% later. Results of laboratory trials [see *H.A.*, 24: 529] and preliminary field trials indicate that parathion and toxaphene may prove satisfactory substitutes for sulphur.

2981. Overman, A. J., Spencer, E. L., and Kelsheimer, E. G.
Will recommended insecticidal practices result in toxic residues in the soil?
Proc. Fla St. hort. Soc. for 1954, pp. 121-2, bibl. 3.

A study was started in 1952 to determine the extent to which toxic insecticidal residues accumulated in the soil. Staked tomatoes were used as indicator plants, and were grown on new land. DDT, both dust and spray, and parathion spray were applied to the leaves, and soil applications of chlordane, dieldrin, heptachlor and demeton were given. Neither crop yield nor quality showed any significant difference due to treatment. There was no indication of toxic accumulations of the materials or of their breakdown products in fine sand.

2982. Treshow, M.
Physiology and anatomical development of tomato fruit tumor.
Amer. J. Bot., 1955, **42**: 198-202, bibl. 9, illus.

Tomato fruit tumour results from rubbing which occurs during picking, handling and processing of green fruits. Green Pearson fruits were artificially induced to form tumours. Inconspicuous wrinkled areas of the outer fruit pericarp were the first visible indication of tumour development, and maximum height of tumours was reached during the mature green stage. On ripe fruits tumours were collapsed, and light brown in colour. Traumatin incited tumour development when applied at 1 or 10 p.p.m.; NAA and MH at 100 p.p.m. inhibited development but did not prevent tumour formation. Rubbing of the fruits caused a mild wounding of the pericarp, so releasing a wound hormone which stimulated tumour formation.—U.S. Steel Corp., Provo, Utah. [See also next abstract and *H.A.*, 25: 671.]

2983. Treshow, M.
The etiology, development and control of tomato fruit tumor.
Phytopathology, 1955, **45**: 132-7, bibl. 7, illus.

In southern California tomato fruit tumours frequently occur on 10–20% of the mature green fruits in the field and increase in extent and frequency proportionally to the amount of handling during the packaging operations. They were shown to be incited by rubbing the tomato fruits while still green. Although no visible cell damage resulted from rubbing, experiments indicated that parenchyma cells just beneath the sub-epidermal collenchyma were torn apart momentarily. The mild wounding was adequate to stimulate responses that incited hypertrophy and hyperplasia. Conditions governing development are discussed. Tumour development may be controlled effectively by allowing green fruits to ripen at 18° C. Their occurrence may be reduced by careful picking and field packing. Fruits in the pink or ripe stages of maturity are not susceptible to tumour formation. [From author's summary.]—Univ. Calif., Riverside.

2984. Morris, L. L.
Field and transit chilling of fall-grown tomatoes.
Reprinted from *Proc. Conf. Transport. Perishables*, Davis, Calif., 1954, pp. 5.

Temperatures below 55° F. inhibit the normal ripening of mature-green tomatoes. Chilling can occur in the field, during transit or after arrival at destination. The best measure of field chilling is the number of hours below 60° F. during the week before harvesting. Mature-green tomatoes should be transported at temperatures between 55° and 75° F., depending on length of haul and ripeness desired. The range of 55° to 65° F. is recommended for transcontinental shipment.

2985. (D.S.I.R., and Ministry of Agriculture, London.)
Tests in short term storage of tomatoes.
Grower, 1955, **43**: 549.

Experimental results for 1954 indicate that fruit for bulk storage must be selectively picked for high and uniform quality at the turning stage. Wooden trays or similar well-ventilated containers should be used for storage. Fruit known to be subject to uneven ripening or "greenback" should not be stored. Potentate tomatoes, selected as recommended above, will continue to ripen at 50° F. (R.H. 90%) for 14 days, and afterwards at higher post-storage temperatures, but resistance to fungal rot may be so reduced that wastage develops either during storage or after sale.—D.S.I.R., Ditton Lab., E. Malling, Kent.

2986. Borders, H. I., Hardenburg, R. E., and Doolittle, S. P.
Plastic bags and crate liners for shipping southern-grown tomato transplants.
Market Grs' J., 1955, **84** (3): 31-2, illus.

In a shipping test polyethylene film was used as a wrapping for bare-rooted tomato plants sent from Georgia to Maryland. For small bundles, ventilated polyethylene film bags proved satisfactory, closed bags perforated with 8–16 quarter-inch holes per 50 plants being better than open-top bags. Non-ventilated film bags caused a physiological breakdown of the plants. The use of polyethylene sheeting for lining crates or hampers gave good protection from wilting to bare-rooted tomato plants even when the lining was only folded over at the top. After 4 days' storage, plants shipped in this way showed less wilting than control plants packed in moist peat in the conventional manner. —Agric. Mktng Serv., U.S.D.A.

2987. Kumuzawa, S., Ohara, T., and Niiuchi, K.
The differentiation of varieties of peppers in Japan. [Japanese, English summary $\frac{1}{3}$ p.]
J. hort. Ass. Japan, 1954, **23**: 152-8, bibl. 15, illus.

A study was made of the botanical characters of the various capsicum varieties grown in Japan, and on the basis of this the varieties are classified into 6 groups.

2988. Simons, J. N.
Some plant-vector-virus relationships of southern cucumber mosaic virus.
Phytopathology, 1955, **45**: 217-19, bibl. 5, being *J. Ser. Fla agric. Exp. Stat.* **325.**

Southern cucumber mosaic, a disease of peppers and celery, was transmitted experimentally by the cotton aphid, *Aphis gossypii*, the green peach aphid, *Myzus persicae*, and the bean aphid, *Aphis rumicis*, in that order of efficiency. Pepper was a better host for aphids than swiss chard and was the more susceptible test plant, although chard seemed to be a better source of virus. Use of the least compatible combination of plants—chard as aphid host, pepper as inoculum source, and chard as test plant—resulted in a significantly lower level of transmission than did the converse—pepper as aphid host, chard as inoculum source, and pepper as test plant. Other combinations gave intermediate results.

2989. Altman, J., and Davis, B. H.
Field tests with streptomycin nitrate for control of bacterial leaf spot of pepper.
From abstr. in *Phytopathology*, 1955, **45**: 183.

In field trials streptomycin nitrate (200 p.p.m., free base) plus a wetting agent applied to [sweet] peppers once in late August or early September significantly reduced the number of lesions due to bacterial leaf spot (*Xanthomonas vesicatoria*).

2990. Elmore, J. C., and Campbell, R. E.
Control of the pepper weevil.
J. econ. Ent., 1954, **47**: 1141-3, bibl. 4.

Results of tests conducted in California in 1947 and 1953 indicate that DDT is the most effective insecticide against pepper weevil, *Anthonomus eugenii*, and that in heavily infested fields frequent applications of 10% DDT dust should be made.

2991. Chapot, H.
Essais de culture de poire-melon (*Solanum muricatum* Ait.) au Maroc. **(Experimental culture of the melon-pear, *Solanum muricatum,* in Morocco.)**
Fruits d'Outre Mer, 1955, **10**: 123-4, illus.

In the Souss area where the experiment is in progress melon-pear culture is very similar to that of other market garden crops. Notes are given on propagation by tip cuttings, irrigation, soil management, flowering, fruit yields, cropping period, pests (principally Mediterranean fruit fly and mealybug), resistance to strong, hot winds and to cold, markets and prices.

Noted.

2992.

a Bailey, K. D.
Rhubarb culture and marketing [in U.S.A.].
Market Grs' J., 1955, **84** (4): 20, 43, illus.
Field and forced crops.

b Banga, O. (Editor).
7^{e} beschrijvende rassenlijst voor groentegewassen [inclusief vroege aardappel, aardbei, tabak, geneeskrachtige en aromatische kruiden]. **(7th descriptive variety list of vegetables [including early potatoes, strawberries, tobacco, medicinal and aromatic herbs].)**
[*Publ.*] *Inst. Vered. Tuinbouwgew. Wageningen*, 1955, pp. 186, illus., fl. 1.75.

c Bellaart, A. C.
Onderzoek van in Nederland gekweekte rhabarberwortel. III. De structuur van glucosiden van rheïne. **(Research on Dutch-grown rhubarb root. III. The structure of the rhein glucosides.)**
Indones. J. nat. Sci., 1954, **110**: 199-200, bibl. 3.

d Best, R. J.
Cross protection by strains of tomato spotted wilt virus and a new theory to explain it.
Aust. J. biol. Sci., 1954, **7**: 415-24, bibl. 12, illus.

e COCHRAN, H. L.
Pimientos in Georgia.
Market Grs' J., 1955, **84** (4): 12, 34-5, illus.

f COE, D. M.
Progress report on the use of streptomycin for the control of bacterial spot of tomatoes under field conditions on South Florida sandy soils.
Plant Dis. Reptr, 1955, **39**: 215-18, bibl. 2.
[Further work necessary.]

g COUCH, H. B.
Studies on seed transmission of lettuce mosaic virus.
Phytopathology, 1955, **45**: 63-70, bibl. 19, illus.
Plant varietal differences noticeable.

h DELOUSTAL, J., AND RIBOTEAU, P.
Les parasites de l'artichaut. **(Pests and diseases of globe artichoke.)**
Jardins d'Aujourd'hui, 1955, No. 13, pp. 409-11, illus.
Symptoms and control.

i FIELDING, M. J.
Experiments with systox as a soil drench for control of the nematode, *Meloidogyne incognita*, of tomatoes.
Plant Dis. Reptr, 1954, **38**: 807-8, bibl. 5.
No significant effect.

j GROENEWEGEN, J. H.
Het randen en andere verdrogingsverschijnselen bij sla. **(Marginal scorch and other drought symptoms on lettuce.)**
Jaarversl. Proefstat. Groent. Fruit. Glas, Naaldwijk, 1954, pp. 66-8, illus.

k DE HAAN, H.
The breeding of peas in the Netherlands. 2. Marrowfats, dun peas and maple peas. [Dutch summary.]
Euphytica, 1955, **4**: 67-75, bibl. 5.

l HABRAN, R., AND LEGROS, N.
La carotte. **(Carrots.)**
Bull. hort. Liège, 1955, **10**: 46-9, illus.
Varieties, cultural practices, economics.

m HENRIKSEN, A.
Sorts- og stammeforsøg med pickles- og sylteagurker 1951-53. **(Trials with varieties and strains of gherkins and pickling cucumbers.)** [English summary 1 p.]
Tidsskr. Planteavl, 1955, **58**: 606-26.

n HUNTER, W. P.
Some crop abnormalities associated with weather conditions.
Proc. Fla St. hort. Soc. for 1954, pp. 111-15, bibl. 13.
As observed on vegetables in Florida.

o KNEEBONE, L. R.
How to grow mushrooms.
Market Grs' J., 1955, **84** (4): 24-5, bibl. 5, illus.

p KRAUS, G., AND HAUSZER, K. T.
Hochwasserschäden an Möhren. **(Flooding injury to carrots.)** [English, French, Spanish summaries.]
Mitt. Klosterneuburg, Ser. B, 1955, **5**: 32-3, illus.

q LAVALLÉE, E.
Essais de fongicides contre le mildiou et l'anthracnose des tomates—1952. **(Trials of fungicides against downy mildew and anthracnose of tomatoes—1952.)**
A.R. Quebec Soc. Prot. Plants 1953, 1954, pp. 47-9.

r LEHMANN, C.
Das morphologische System der Kulturtomaten (*Lycopersicon esculentum* Miller). **(The morphological system of cultivated tomato varieties.)**
Kühn-Arch., 1954, **68**: 360-1.*
A taxonomical study of *Lycopersicon esculentum* and *L. pimpinellifolium* varieties and subspecies.

s LEONARD, W. F.
Onion seed production.
N.Z. J. Agric., 1955, **90**: 289-93, bibl. 2, illus.

t LORZ, A. P., AND WALTER, J. M.
Pole bean breeding in Florida.
Proc. Fla St. hort. Soc. for 1954, pp. 157-8.
Aimed at producing a rust-resistant fresh-market runner bean.

u LUCKWILL, L. C., AND WOODCOCK, D.
Plant growth regulators. I. The influence of side-chain length on the activity of ω-(2-naphthyloxy)-*n*-alkylcarboxylic acids for the induction of parthenocarpy in tomatoes.
J. hort. Sci., 1955, **30**: 109-15, bibl. 8.

v MCCLOY, J., WOODFORDE, J., AND WARNER, M. G. R.
The drying of blue peas.
Tech. Mem. nat. Inst. agric. Engng **118**, 1955, pp. 18, bibl. 13, illus.

w MACGILLIVRAY, J. H., CLEMENTE, L. J., AND BRENDLER, R. A.
A preliminary study of labor use in the harvesting of chili peppers in Ventura county 1953.
Veg. Crop Ser. Univ. Calif. **63**, 1953, pp. 11.
Possibilities of reducing labour indicated.

x MINGES, P. A., AND HARRINGTON, J. F.
What you should know about growing snap beans.
[*Publ.*] *Univ. Calif. agric. Ext. Serv.*, 1954, pp. 15, illus.

y MINISTRY OF AGRICULTURE, LONDON.
Glasshouse white fly.
Adv. Leafl. Minist. Agric. Lond. **86**, revised 1954, pp. 4, illus.
Trialeurodes vaporariorum.

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* Summary of a thesis.

z MINISTRY OF AGRICULTURE, LONDON.
Diamond-back moth.
Adv. Leafl. Minist. Agric. Lond. **195,** amended 1954, pp. 2, illus.
Plutella maculipennis.

2993.
a MINISTRY OF AGRICULTURE, LONDON.
Tomato leaf mould.
Adv. Leafl. Minist. Agric. Lond. **263,** amended 1954, pp. 4, illus.
Cladosporium fulvum.

b N.S.W. DEPARTMENT OF AGRICULTURE.
Cultivation of rhubarb.
Agric. Gaz. N.S.W., 1955, **66**: 78-9.
Culture, varieties, downy mildew.

c OGILVIE, L.
Diseases of vegetables.
Bull. Minist. Agric. Lond. **123,** revised 4th edition 1954, pp. 8, illus.
[For earlier editions see *H.A.*, 11: 1210, 15: 609, 20: 815.]

d PATERSON, D. R.
Some effects of maleic hydrazide as a pre-harvest foliage spray on the storage behavior of onions.
Proc. 9th annu. Rio Grande Valley hort. Inst., 1955, pp. 39-42, bibl. 10, illus.
A review.

e REHEM, —.
Vegetable production.
IMMAMUDDIN, —.
Practical hints.
Pakistan Rev. Agric., 1955, **1** (3): 27-30.
Brief practical hints on vegetable growing in the Karachi district.

f THOMPSON, R. C., AND CAFFREY, D. J.
Cauliflower and broccoli. Varieties and culture.
Fmrs' Bull. U.S. Dep. Agric. **1957,** revised 1954, pp. 16, illus., 10 cts.

g VARGAS SACO, R.
Cultivo del frijol. (**Bean [*Phaseolus vulgaris*] culture.**) [English summary ½ p.]
Bol. Estac. exp. agric. La Molina **54,** 1954, pp. 94, bibl. 32, illus.
For Peru and elsewhere.

h ZINK, F. W., AND WELCH, J. E.
Performance of commercial head lettuce varieties and strains in the central coastal section of California in 1953.
Veg. Crops Ser. Univ. Calif. **62,** 1954, pp. 27.

TOBACCO.

General.

(*See also* 2787, 3400.)

2994. TOBACCO DIVISION, CENTRAL EXPERIMENTAL FARM, OTTAWA, CANADA.
Progress Report, 1949/53, of the Tobacco Division, Central Experimental Farm, Ottawa, 1955, pp. 43, illus.

Development of the industry. Acreage, production, price, imports, exports, manufacture, consumption. [For sections on Agronomy, Varietal improvement, Physiological studies and Nutritional studies see separate abstracts.]

2995. REYNEKE, J.
Tobacco research. [Forming part of the Annual Report of the Secretary for Agriculture, Union of S. Africa, for the year ending 31 August, 1954.]
Fmg S. Afr., 1955, **30**: 166-8, 197-8.

Climatological studies: It was observed that the highest yields and best quality tobacco were obtained in a dry year with a rainfall of 369 mm. Early planting is recommended to avoid unfavourable climatic conditions in late summer and autumn. *Quality of flue-cured tobacco:* A very close relationship was found between sugar content and leaf quality; a good quality tobacco contained from 15 to 26% sugar. Optimum controlled growth conditions existed under a high light intensity, with hot days (78° F.) and cool nights (52° F.). *Soil fertility studies:* Chlorine content of the leaf rose with increased potassium chlorate applications. Drowning of tobacco was largely confined to low-lying, heavy, deep turf soils. In a study of water requirements it was shown that tobacco roots penetrated the sub-soil only to the depth of saturation by irrigation water; with shallow saturation more irrigations were required and the resultant leaf was less suitable for curing; the N content of the leaf varied with saturation depth, being higher at shallow saturation. *Cultivation studies:* Crop rotation systems, variety trials, suckering control by hormones and oil, eelworm control, mildew control with karathane and Iscothane, and production of mosaic-resistant varieties.

2996. NYASALAND.
Tobacco.
A.R. Nyasaland Dep. Agric. 1953/54, Part II, 1955, pp. 16-22.

Dark tobacco. Fertilizer trials: In experiments at Lilongwe and Tuchila the response to N was again outstanding but to P and K was not significant. Method of placement was significant at Tuchila only, where application in a hole approximately 3 in. to one side or both sides of the plant significantly improved crop index. Cultural trials: In a dung and time of planting trial dung gave a response at Tuchila and the 1st and 2nd plantings were significantly better than the 3rd. In a priming-topping trial at Lilongwe priming improved yield and grade, and higher topping increased yield and value. Omission of priming lowered the value of all leaves. In a spacing, number of leaves and nitrogen, trial at Lilongwe yield and quality improved with increased N, and plants on which 9·5 (average) leaves were left per plant had a substantially higher yield and crop index than those with 7·7 leaves.

Over 3 years close spacing (3×2 ft) has given higher yields than 3×2½ or 3×3, but crop index results have varied. Rotations: After the 1st test year tobacco yielded highest after groundnuts and lowest after tobacco, and fertilizer had no significant residual effect. *Burley.* The Stand Upright variety is considered one of the best introductions, and Barnet Special shows promise. In a fertilizer trial N but not P or K gave increased yield. Spacings of 18 and 24 in. between plants in the ridge gave significant yield increases over 30 in. spacing but were not significantly different from one another. *Flue-cured.* In an NPK and method of placement trial on land which had been under natural grass the year before, N was highly significant, P significant, and K and placement not significant. In another trial on land which had been under tobacco the year before, N was highly significant, K was very significant and P and placement were not significant. It was concluded that though some land may have enough K when first cultivated it would not be safe to omit K fertilization without prior soil analysis.

2997. MACDOWALL, F. D. H.
Physiological and analytical studies.
Progr. Rep. Tobacco Div., centr. exp. Fm, Ottawa, 1949/53, 1953, pp. 32-5, illus.

Composition and quality. In a comparison of U.S. and Canadian flue-cured tobaccos Ca was primarily responsible for the higher ash content of the latter and appeared to be directly proportional to quality. *Composition and growth conditions.* In a study on the effects of light intensity (34 and 100% sunlight), N fertilization (0, 15 and 30 lb. N per acre) and leaf position, nicotine and total N content of cured leaves increased with N, light intensity and height of leaf on plant. *Composition and flue-curing.* In a study on hydrolysis of starch to sugars percentages of starch, reducing sugars and sucrose were recorded every 12 hours up to 108 hours. *Composition and air-curing.* Translocation of mineral constituents between leaf and stalk during air-curing was investigated. Most occurred during the first week. The changes in the N content of the centrifugally separated chloroplasts and of the water-soluble proteins were determined during curing. During 11 days roughly the same amounts of chloroplastic and non-chloroplastic protein was digested. Digestion was more rapid in attached than in primed leaves. *Alkaloid content* of 105 varieties was investigated. It fluctuated considerably with environmental factors and ranged from 0·1 to 4·0% of leaf dry matter. *Mineral absorption.* The mineral contents of leaves at different stages of growth cycle are given. In the leaf Ca and total ash increased and P decreased with age. Total ash and individual element (Fe, Al, Ca, Mg, P, K, S, Cl, Mn) contents of stalk and roots decreased with age. The rate of mineral absorption paralleled the rate of growth of all parts. Rainfall was the most significant factor in determining amount of growth and absorption of minerals. The growth and metabolism of isolated roots of *Nicotiana rustica* in Whyte's medium were studied.

2998. WEYBREW, J. A., AND OTHERS.
Factors affecting nicotine in tobacco.
Res. and Fmg, 1953, **12** (1/2): 4-5.

This popularly written article is based on numerous tests by workers at the North Carolina State College Agricultural Experiment Station. The 5 main factors affecting nicotine content are (1) moisture supply, content varying inversely with the moisture received by the plant; (2) nitrogen supply, content increasing with increasing nitrogen; (3) varietal differences; (4) topping and suckering, content increasing with earliness of topping and severity of suckering; and (5) fertility left from preceding crop in rotation, content increasing with increasing fertility, especially nitrogen. Experimental results are given. Factors having little or no effect on nicotine content are: (1) denser spacing; (2) P, K, Ca, Mg, Cl and S fertilization; (3) B, Cu, Zn, Mn and Mo fertilization; (4) winter cover crops; and (5) D-D and EDB.

2999. LEETE, E.
The biogenesis of nicotine.
Chem. Ind. Lond., 1955, No. 19, p. 537, bibl. 8.

Radioactive ornithine added to a nutrient solution was absorbed by tobacco plants and used by them for the synthesis of the pyrrolidine ring of nicotine. The fact that only half the radioactivity found in the nicotine is located in the α-carbon of the pyrrolidine ring attached to the pyridine ring indicates that ornithine is not a direct precursor of the nicotine. An hypothesis which would explain this result is the subject of further investigations.—Dep. Chem., Univ. Calif.

Varieties.

(*See also* 2992b.)

3000. WHITE, F. H.
Varietal improvement.
Progr. Rep. Tobacco Div., centr. exp. Fm, Ottawa, 1949/53, 1955, pp. 24-31.

Varietal testing of cigar strains (pp. 29-31). In a trial of introduced varieties and strains Havana K1 (413) and Havana 322A (415) were significantly superior to the established commercial variety Resistant Havana 211 in yield and crop returns, but the first was less resistant to black root rot (*Thielaviopsis basicola*) when conditions were optimum for infection. The Ottawa hybrids 406 and 410 appeared equal to Resistant Havana 211 in yield and returns per acre. In a trial of early-maturing strains 613 (a Resistant Havana 211 derivative) was significantly superior to Resistant Havana 211 in acre yield, grade index and crop index. In a trial of strains resistant to black root rot several hybrids were superior to their susceptible parent in both yield and quality and the results showed that resistance has been successfully transferred from Resistant Havana 211 to susceptible varieties.

3001. AKEHURST, B. C.
Turkish or oriental tobacco in Southern Rhodesia.
Emp. J. exp. Agric., 1954, **22**: 267-80, bibl. 12.

Results of experiments with Turkish or oriental type tobacco in S. Rhodesia are reported. Smyrna type varieties gave the best results, but the variety Soulouk lacked uniformity. The production of seedlings, time of planting, and fertilization are discussed.

3002. Puzzilli, M.
Sul comportamento di alcune linee di tabacco in carenza idrica. **(On the drought resistance of certain tobaccos.)**
Tabacco, 1955, **59**: 3-16, bibl. 8.

Seven tobacco varieties and strains were subjected to germination tests in sucrose solutions of different strengths. On the assumption that drought resistance in a plant is related to the imbibition powers of its seed, Virginia Bright 5 and 49 showed the greatest and Kentucky 15 and 20, Burley Giuseppina and Virginia Bright 4 the least drought resistance while Virginia Bright 9 was intermediate.

Cultural practice.

3003. Gilmore, L. E.
Agronomy.
Progr. Rep. Tobacco Div., centr. exp. Fm, Ottawa, 1949/53, 1955, pp. 13-23, illus.

In all experiments the cigar variety Resistant Havana 211 was used. *Cultivation.* Experiments on sandy soils show that where weeds are a problem 2 or sometimes 3 cultivations are necessary, but that otherwise cultivation has little effect on yield and acre returns. *Fertilization.* Ca and P at 3 and S at 2 levels were applied singly and in all possible combinations. P as sodium biphosphate had a highly significant effect, giving increases in yield, grade index and crop index from both 100 and 200 lb. phosphoric acid per acre. Ca as calcium carbonate had no effect. S as sodium sulphate at 104 lb. S per acre reduced yield significantly compared with no S and lowered crop returns. *Rotation.* In studies on the common, commercial rye-tobacco rotation, rye fertilization did not have a significant effect on tobacco yield, grade index or crop returns. Late seedings of rye had the best effect on the tobacco. *Harvesting.* In experiments on Resistant Havana 211 and 3 other varieties, priming was compared with the standard stalk-cutting method of harvesting. Priming increased yield or crop returns or both and, with early-maturing crops, grade index. In a successive primings test in which 3 leaves were picked at the 1st priming, 4 at the 2nd and 3rd and the remainder at the 4th, the 3rd gave the highest yield, grade index and acre value, and the highest grade values resulted chiefly from an increase in binder leaf and a decrease in trash leaf. In an experiment in which Resistant Havana 211 was harvested by a combination of the priming and stalk-cutting methods, priming 10 leaves per plant in 3 primings gave the highest grade index, the best crop index and the second best yield.

3004. Scarascia, G. T.
Azione di alcuni alcaloidi sulla germinazione del tabacco e sulle mitosi di apici radicali. **(Effect of certain alkaloids on germination and on mitosis in the root tips of tobacco.)** [English summary 14 lines.]
Tabacco, 1955, **59**: 133-53, bibl. 16, illus.

Treatment with caffeine, theobromine, quinine, atropine or nicotine at different concentrations did not increase the germination rate in seeds of the Erzegovina tobacco variety, and in many cases it retarded or stopped the development of the embryo.—Ist. sci. sper. Tabacchi, Rome.

3005. Raeber, J. G.
Effect of transplanting techniques on the uniformity of tobacco experiments.
S. Afr. J. Sci., 1955, **51**: 253, bibl. 1.

Nearly all plants developed best when transplanted at about 2 in. high into paper frames 1½ in. square and 4 in. high in the greenhouse and thence into the field at normal size. When, however, they were pricked out before final planting out or were planted out direct from the seedbed some remained stunted.—Tobacco Res. Bd, P.O. Box 1909, Salisbury, S. Rhod.

3006. Volodarskiĭ, N. I.
The effect of leaves of different age on the time of bud formation in tobacco. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1955, **100**: 797-800, bibl. 8.

Results of experiments with the day-neutral tobacco variety Trapezond 93 show that the removal of the upper, growing leaves had no effect on the time of bud formation, but the removal of lower, fully grown, photoperiodically active leaves retarded bud formation. In one case, where only actively growing leaves were allowed to remain on the plants, bud formation was completely prevented, and in another case, where only the 2 oldest leaves were retained and these turned yellow, bud formation was also prevented.

3007. Woltz, W. G.
Some effects of topping and suckering flue-cured tobacco.
Tech. Bull. N.C. agric. Exp. Stat. **106**, 1955, pp. 24.

Nine experiments were made at 5 stations in 1949/51. Results were: (1) topping to 18–24 leaves when 5–10 flowers were pink followed by complete suckering gave high yields and value indices; (2) extra N did not compensate for failure to top and sucker; (3) the omission of topping and suckering decreased yields of good quality leafy grade without increasing those of the lug and cutter grades; (4) additional nitrogen fertilizer tended to result in increases in N and nicotine content and a reduction in sugar content; (5) topping and suckering had little or no effect on N and K content or burn rate; (6) no topping considerably decreased nicotine and sugar content compared with normal topping with complete suckering.

3008. Brikelj, A. Ja.
Resistance of tobacco to the first autumn frosts. [Russian.]
Tabak, 1955, **16** (1): 17-18.

In Kazahstan early frosts sometimes occur in September causing serious damage to tobacco. Frost resistance is believed to be improved by the accumulation of soluble carbohydrates (sugars) in the leaves and this in turn can be obtained by timely topping and removal of laterals. When tobacco plants were topped, their laterals and lower leaves removed, and irrigation withheld, their upper leaves withstood −6° C.

3009. Marcelli, E.
Prove circa l'azione dell'idrazide maleica sul tabacco. **(Tests on the effect of maleic hydrazide on tobacco.)**
Tabacco, 1955, **59**: 17-31, bibl. 18, illus.

Maleic hydrazide applied to Kentucky and Virginia Bright caused abnormalities ranging from narrowness and chlorosis in the apical leaves at 800 p.p.m. to stoppage of growth, complete suppression of flowering, frenching, polyphylly, and leaf blade deformation and discoloration similar to that met with in frenching at 2,000 p.p.m. A significant retarding of flowering was observed only at 500 p.p.m. and then only in half the flowers, the remainder falling prematurely, a circumstance which points to the difficulty of distinguishing between a retarding and an inhibitory action by maleic hydrazide. Treatment of Kentucky the day after topping caused a reduction in the number of suckers. 800 p.p.m. was the most satisfactory of 3 rates tried. 1,000 and especially 2,000 p.p.m. caused greater reduction in the number and size of suckers but also caused the leaf abnormalities and chlorosis noted above.

3010. Volodarskiĭ, N. I., and Sautič, Z. M.
Irrigation of tobacco seedlings with periodical drying off of the soil. [Russian.]
Tabak, 1955, **16** (1): 8-10.

Withholding water from tobacco seedlings during rooting reduced root rot [*Thielaviopsis basicola*] incidence and, though causing temporary retardation in growth, resulted in greatly improved transplants. On the basis of experimental results obtained in the Kuban it is recommended that the watering of tobacco seedlings during rooting should be repeatedly interrupted for 3–5 days, and when the top growth is being formed water should be applied as usually recommended but with periodical 1– to 2–day interruptions. During rooting 2 superphosphate top dressings, one at half and the other at full rate, should be given, and 3–4 days after the resumption of normal watering a full dose of nitrogen should be applied.

3011. Bolton, A.
Improved methods of tobacco seed production.
Rhod. Tobacco, 1955, No. 8, pp. 8-9, illus.

Experiments by the Southern Rhodesia Tobacco Research Board led to the following recommendations for seed production: (1) 60 lb. N, 100 lb. P_2O_5, 100 lb. K_2O and 20 lb. MgO per acre; (2) no trimming or reaping; (3) $3\frac{1}{2}\times2$ ft spacing. Yields of 300 lb. seed per acre have been obtained.

3012. Patil, N. A.
Germination of stored tobacco seed.
Indian Tobacco, 1955, **5**: 23-4, bibl. 1.

In tests at the Nipani Tobacco Breeding Station the seeds of 2 bidi and 2 flue-cured Virginia varieties maintained their germination capacity well for 3 years when stored in air-tight containers, giving 83% or more germination. Germination of the bidi tobaccos fell to 37 and 50% in the 4th year and was negligible in the 5th. Harrison Special and Bonanza had germination rates of 78 and 64% in the 4th year and 8 and 7% in the 5th.

Nutrition.

3013. McEvoy, E. T.
Nutritional studies.
Progr. Rep. Tobacco Div., centr. exp. Fm, Ottawa, 1949/53, 1955, pp. 36-41, illus.

Effect of sodium was studied in sand culture in a 3×3 Na–K experiment. K but not Na had a significant effect on yield. Na–K interaction was significant. Successive increments of Na caused decreased yield at high K supply but not at zero K supply. *Influence of Ca, P and S* on advanced growth in flue-cured Mammoth was studied in sand culture. P had the greatest effect followed by Ca and then by S. *Optimum supply of Mn* for flue-cured tobacco was investigated in sand culture. 0·5 p.p.m. gave the highest yield. Higher concentrations were toxic. *Nutrient foliar sprays.* In N-deficient plants bi-weekly 3, 5 and 10% urea sprays and a 5% calcium nitrate spray significantly increased yield. In P- and K-deficient plants a 5% potassium bihydrogen phosphate spray increased growth. Leaf-feeding gave less growth than complete-nutrient root-feeding. *Effect of ammonium and sulphate fertilization.* Mg deficiency (sand drown) is sometimes accentuated by high ammonium sulphate fertilization. Sand culture experiments show that, while both the ammonium and sulphate components lower Mg content, the ammonium is largely responsible for the Mg deficiency disorder. *Minor elements in cigar tobacco fertilization.* Neither B nor Cu gave significant differences in yield or crop value. *Chemical control of suckers.* Nine different substances were tested, application being made either in liquid form to the stem wound or as a spray on the upper leaves after topping. NAA and isopropyl 2,4-dichlorophenoxyacetate reduced sucker growth significantly but slightly reduced yield, grade index and crop index. One of the 3 oil treatments gave significant reduction in sucker growth and significant increases in yield, grade index and crop index. Of 4 maleic hydrazide treatments 3 reduced sucker growth significantly and one of these 3 significantly increased yield, grade index and crop index. *Sterilization of seedbeds.* In a comparison of steam, methyl bromide and calcium cyanamide steam gave good control of disease and weeds with excellent plant production, methyl bromide gave good control of weeds and excellent plant production and calcium cyanamide did not give satisfactory weed control.

3014. Shaw, L.
Aromatic tobacco: fertility, spacing, and transplanting studies.
Bull. N.C. agric. Exp. Stat. **386,** 1954, pp. 28, bibl. 8, illus.

In experiments on the aromatic tobacco varieties Smyrna 23 and Samsun 15 conducted at the Mountain and Upper Mountain Experiment Stations since 1945 (1) 160 lb. phosphoric acid per acre gave much higher yields than 40 lb.; (2) transplanting date had no important effect; (3) sodium nitrate gave higher yields but lower quality than cotton seed meal; (4) increasing nitrogen (0, 20 and 40 lb. per acre compared) increased yield and gross acre returns, regardless of row interval or plant spacing in the row, and decreased quality; (5) reduction of row interval from 25 to 15 in. and of spacing in the row from 9 to 3 in. improved acre yields, gross acre returns and quality; (6) increased nitrogen and wider spacing gave increases in number of leaves harvested per plant, leaf size and stalk height, and lower leaf quality but not always lowest acre yields.

3015. Baldacci, E., Betto, E., and Amici, A.
Il metabolismo del fosforo nei tessuti verdi lesionati studiato con P^{32}. **(Phosphorus metabolism of lesions in green tissue studied with P^{32}.)** [German summary.]
Phytopath. Z., 1955, **23**: 335-40.

Tobacco plants growing in nutrient solution had their leaves scratched by carborundum powder. After application of radioactive P it was apparent that P uptake by injured leaves was greater than that by whole leaves. During callusing most of the P requirement was absorbed from the nutrient solution.—Univ. Milan.

3016. Steinberg, R. A.
Effect of boron deficiency on nicotine formation in tobacco.
Plant Physiol., 1955, **30**: 84-6, bibl. 8, illus.

Connecticut Broadleaf tobacco was grown in water culture deficient in micronutrients. The alkaloid content of leaves of plants deficient in Zn, Fe, Cu and Mo varied little from that of the controls. B and Mn deficiencies, however, significantly affected alkaloid content. In one test the B deficient plant showed a four-fold increase in alkaloid concentration, expressed as % total dry weight, and an increase in quantity of nicotine of about 60%. This occurred in spite of a 60% loss in dry weight yield of the B-deficient plant. Decreased alkaloid in the Mn-deficient plant seemed to be a direct consequence of decreased yield, which was equivalent to 20% of the control. Other tests gave comparable results. Data relating increased nicotine synthesis to development of B deficiency symptoms indicated that nicotine formation is associated primarily with apices of shoots and roots. Nicotine began to accumulate rapidly shortly after excessive root branching had begun (prior to bud necrosis) in the B-deficient plant, and increased rapidly with further aggravation in symptoms. The final result was a rapid and parallel increase in number of root-tips and quantity of nicotine produced that was strikingly greater than for either control or Mn-deficient plants.—U.S. Dep. Agric., Beltsville, Md.

3017. Sequeiros, J. M., Galbis, J. A., and Oliver, J.
Estudios de abonado sobre suelos tabacaleros españoles. I. Experiencias de semi-laboratorio, acerca de la influencia del nitrógeno y del potasio sobre el contenido de cloro en la planta. (**Manurial studies on Spanish tobacco soils. I. Pot experiments on the effect of nitrogen and potassium on chlorine content.**) [English summary 12 lines.]
Bol. Inst. Invest. agron. Madrid, 1954, **14**: 447-78, bibl. 48.

Earlier research at the Tobacco Biology Institute, Seville, showed that the burning quality of Spanish tobacco is governed by its high content of harmful anions, chiefly Cl^-, and, in some cases, its low content of K^+. An account is now given of pot experiments on 3 typical soils of the Granada tobacco-growing area to determine the effects of N and K fertilizers on the mineral content of the tobacco leaf. Either ammonium sulphate or ammonium nitrate was the source of N, and sodium phosphate and potassium sulphate were the sources of P and K. The results were: (1) N fertilization reduced the Cl^- content, that in nitrate form more than ammonia; (2) increasing K as sulphate with constant N and P progressively increased the reduction of Cl^- caused by N fertilizer; (3) by these means Cl^- was reduced to a content below that at which burning is inhibited.

Diseases.

(*See also* 2604, 3026a, e-g.)

3018. Riley, E. A.
Tobacco anthracnose. II: Some physiological characteristics of the causal organism in relation to epidemiology.
Trop. Agriculture Trin., 1955, **32**: 150-5, bibl. 2.

It has hitherto been the practice to begin spraying when the seedling leaves attain the size of a shilling, i.e. 2–3 weeks after germination. The investigation described suggests that this may prove too late to check the appearance of anthracnose (*Colletotrichum tabacum*). Trials with bordeaux mixture and several of the new organic fungicides have shown that half-strength mixtures can be used with safety within 1–2 weeks of germination. Change-over to the full-strength mixtures is mad eat the "shilling" size. This practice is now generally recommended.—Dep. Agric., N. Rhodesia.

3019. Müller, H.
Versuche zur Bekämpfung von *Thielavia basicola* Zopf. (**Experiments on the control of *Thielavia basicola*.**) [English summary ½ p.]
Z. PflKrankh., 1955, **62**: 193-207, bibl. 20, illus.

In pot trials with the susceptible tobacco variety Virgin B, calcium cyanamide and two proprietary preparations of this compound containing a fungicide, FK85 and FK86, were found to be suitable substitutes for formalin in the control of *Thielavia basicola* in tobacco seed bed soil. The best results were obtained with the addition of FK86 at 3 kg./m.^{3} soil, but satisfactory control was also achieved with 3 kg./m.^{3} calcium cyanamide or with the superficial application of calcium cyanamide at the rate of 60 g./m.^{2}. The chemicals were applied 25–30 days before sowing or transplanting.—Landw. Hochschule Stuttgart-Hohenheim.

Pests.

(*See also* 2734n, 3397.)

3020. Parry Jones, E.
Research on tobacco pests in Southern Rhodesia.
Commun. sci. IIIe Congr. int. Phytopharm., 1952, Vol. II, being *Phytiatrie-Phytopharm.*, Num. spéc., 1954, pp. 491-8, bibl. 10.

Research in 1947/52 led to the following recommendations for the control of tobacco pests. (1) *Heterodera marioni*. Seedbed control by injecting EDB (85% by weight) or D-D at 38×38 cm. spacing and 23 cm. depth, the rates being 112 (plus diluent) and 865 l. respectively for eradication, and half these for protection only. Field treatment by injecting the planting stations only, through the ridge to a point 7·5 cm. below the level of the ridge base, with either 4 c.c. of a mixture of 3 parts EDB to 8 parts diluent or 8 c.c. D-D per station a fortnight before planting. (2) Insect soil pests including cutworms and white grubs. Application of 100 c.c. 0·1% chlordane emulsion in a saucer-like depression at each planting station, preferably before planting out. (3) Crickets. Injection of 4 c.c. of 3 parts EDB to 7 parts diluent through the entrance hole of the burrow to 23 cm. depth, or late-season broadcasting of bait dipped in 0·1% chlordane emulsion. (4) Aphis (*Myzus persicae*) and white fly (Aleurodidae). Spraying with parathion wettable powder (0·34 kg. technical per ha. [?acre]) or, preferably, with bis-dimethylamino phosphonous anhydride at 2·25–4·5 kg. active ingredient per acre. Control of *Heliothis armigera*, black (harvester) ants, *Gnorimoschema operculella* and *G. heliopa* is also mentioned.—Pest Control (Central Africa) Ltd., S. Rhod.

3021. Lownsbery, B. F., and Peters, B. G.
The relation of the tobacco cyst nematode to tobacco growth.
Phytopathology, 1955, **45**: 163-7, bibl. 16.

In an outdoor pot experiment the height and final weight of plants of Connecticut 15 shade tobacco were inversely proportional to the logarithm of the initial density of viable encysted larvae of *Heterodera tabacum* (the tobacco cyst nematode) in the soil in which the plants were grown. Every 10-fold increase in density led to a loss in plant weight of 139 g. for normally fertilized plants and 25 g. for smaller, unfertilized plants. The highest density which maintained itself was 1,000 larvae/g. of soil. At this density the reduction in weight of normally fertilized plants was 25%. A field reduction of this magnitude would be economically important. In a field trial Connecticut 15 and Connecticut 49 shade tobacco plants grown 2 months in D–D-treated plots (0·1 viable encysted larvae/g. of soil) were 15 and 22% taller, respectively, than controls grown in untreated plots (103 viable encysted larvae/g. of soil). In this experiment, however, nematode reduction was confounded with other fumigant effects, e.g. ammonia nitrogen was raised and nitrate nitrogen was lowered. [From authors' summary. For previous abstract see *H.A.*, 25: 732.]—Conn. agric. Exp. Stat., New Haven.

3022. Miles, P. W.
Problems in soil insecticide research in Southern Rhodesia.
S. Afr. J. Sci., 1955, **51**: 207-10, bibl. 4.

The distribution patterns of soil insect pests in tobacco lands are erratic and must be taken into account when assessing the results of field experiments on soil insect pest control. A method of obtaining more accurate results is given. It is based on the equation $i \propto 1 - \frac{li}{lo}$ where i is treatment effects, li is loss in treated plots and lo is loss in flanking guard rows. Means are shown whereby this method of presenting results of field insecticide experiments can be adapted to other types of control experiment.

3023. Tirelli, M.
Effetto di alcuni insetticidi clorurati sul tabacco e suoi insetti fitofagi. (**Effect of certain chlorinated insecticides on tobacco and its pests.**)
Tabacco, 1954, **58**: 355-428, bibl. 183.

After reviewing the literature on the chemistry of the 4 naphthalene chlorinated insecticides, aldrin, dieldrin, endrin, and isodrin, their effect on the soil, their toxicity to warm-blooded animals and their uses in hygiene and agriculture, the author gives an account of laboratory and field experiments with aldrin and dieldrin on tobacco. A single spray of emulsifiable concentrate of aldrin at 2 kg. active ingredient or dieldrin at 1 kg. per ha. gave control of cutworms and wireworms. The insecticides were not toxic to the tobacco over which they were sprayed. Light cultivation is necessary after dieldrin treatment and beneficial after aldrin.

3024. Tirelli, M.
Utile attrezzatura per la disinfestazione nel vuoto. (**A useful vacuum fumigation apparatus.**)
Tabacco, 1955, **59**: 127-32, bibl. 2, illus.

A description is given of a recently built lorry-mounted apparatus for the vacuum fumigation of raw or manufactured tobacco with methyl bromide.—Osserv. fitopat., Rome.

Grading.

(*See also* 3026b.)

3025. Lopatina, G. G.
Grading tobacco by artificial light. [Russian.]
Tabak, 1955, **16** (1): 55-8.

Luminescent lamps were found more suitable for tobacco sorting than incandescent lamps. For adequate local illumination 650–750 lux is necessary, which is provided by an illuminant of 3 lamps of 30 W., 220 V., or 2 illuminants of 3 lamps of 15 W., 110 V. each, placed 0·8–1 m. above the working surface. It is recommended that the lamps should be changed after 1,000 hours and then used for general illumination of the work room, for which purpose the same type of lamp as used over the sorting table should always be employed.

Noted.

3026.

a Bartels, W.
Nicotiana texana Hort. als Testpflanze für das Tabakmosaik-Virus. (***Nicotiana texana* as a test plant for tobacco mosaic virus.**)
NachrBl. dtsch. PflSchDienst, Berlin, 1955, **9**: 75-6, bibl. 14, illus.

b Bennett, H., and Feuell, A. J.
Tobacco from Antigua.
Colon. Plant Anim. Prod., 1954, **4**: 310-13.
Unfavourably reported on by the Colonial Products Laboratory.

c Ghezzi, G.
La determinazione pratica, rapida e precisa del contenuto di acqua (umidità) della maggior parte dei prodotti di interesse merceologico e del terreno agrario.—I Parte. (**The practical, rapid and accurate determination of the moisture content of most industrial products and of agricultural soil.—Part I.**)
L'umidità del tabacco ed un nuovo metodo pratico di essiccamento a raggi infrarossi per determinarla.—II Parte. (**Moisture content of tobacco and its determination by a new practical method of drying by infrared rays.—Part II.**)
Tabacco, 1955, **59**: 39-75, bibl. 16, illus., 76-121, bibl. 10, illus.

d GRIFFITH, R. B., VALLEAU, W. D., AND STOKES, G. W.
Determination and inheritance of nicotine to nornicotine conversion in tobacco.
Science, 1955, **121**: 343-4, bibl. 3.

e GRUŠEVOĬ, S. E., AND SIGAL, L. A.
Virus diseases of tobacco in the western regions of the Ukraine. [Russian.]
Tabak, 1955, **16** (1): 18-19, illus.

f KÖHLER, E.
Beitrag zum Prämunitätsproblem. Studien am Tabakmosaik. **(Contribution to the cross-immunity problem. Studies on tobacco mosaic.)**
Phytopath. Z., 1955, **23**: 323-7, bibl. 5, illus.

g OWEN, P. C.
The respiration of tobacco leaves in the 20-hour period following inoculation with tobacco mosaic virus.
Ann. appl. Biol., 1955, **43**: 114-21, bibl. 6.

h PORTER, H. K., AND MAY, L. H.
Metabolism of radioactive sugars by tobacco leaf disks.
J. exp. Bot., 1955, **6**: 43-63, bibl. 35.

i RUNECKLES, V. C., AND PORTER, H. K.
Some effects of 2:4-dinitrophenol on the carbohydrate metabolism of tobacco leaf disks.
From abstr. in *Biochem. J.*, 1955, **59** (3): xxiii, bibl. 2.

MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS.

Culinary plants.

(*See also* 3069a, e, 3161, 3386, 3391.)

3027. DOMINGO, N. T., Jr.
Germination of vanilla seeds.
Philipp. Agric., 1954, **37**: 543-9, bibl. 7, illus.

Vanilla seeds planted under diffuse light and at room temperature germinated in about three months. Bouriquet's vanilla decoction agar appeared to be more efficient as a germinating medium for vanilla seeds than either coconut water agar or tomato juice agar. The growth of the seedlings in the coconut water agar was not very satisfactory, but this disadvantage was made up for by the availability, economy and ease of preparation of the medium. No germination took place in the tomato juice medium. [Author's summary.]

3028. VIOLANDA, A. T.
On the natural occurrence of two crystalline forms of vanillin.
Philipp. Agric., 1954, **37**: 507-11, bibl. 5, illus.

Two different crystal forms of vanillin were found on the surface of cured vanilla pods, namely needles and tetragonals. Investigations on the properties of these crystals showed that both gave the characteristic smell of vanilla and that suspicions that they might be calcium oxalate were unfounded.

Drug plants.

(*See also* 2992b, f, i, j, n, o, u, w, 3369k.)

3029. MCKENNA, G. F., TAYLOR, A., AND BURLAGE, H. M.
Chemotherapy experiments with plant extracts and transplantable tumors.
Reprinted from *Texas Reps Biol. Medic.*, 1954, **12** (3): 500-8.

The results of the experiments described indicate that some plants contain substances which will inhibit the growth of animal tumours. Among the more effective extracts tested by 3 methods were those from *Anemone decapetala* and *Liatris punctata.*

3030. SIRSI, M., AND OTHERS.
Studies on Indian medicinal plants. Pharmacological actions and antibacterial activity of *Anisochilus carnosus* (Labiatae).
J. Indian Inst. Sci. Sect. A, 1955, **37**: 98-105, bibl. 6, illus.

The investigations described indicate that the essential oil of *A. carnosus* may prove useful as an antispasmodic drug and as a clinical fungicide. It also possesses bacteriostatic and bactericidal properties.—Indian Inst. Sci., Bangalore.

3031. MANIL, P., AND FOURNEAU, J.
Action du thiouracile et de l'uracile sur le crown-gall. **(Action of thiouracil and uracil on crown gall.)**
Bull. Inst. agron. Gembloux, 1955, **23**: 55-65, bibl. 9, illus.

From studies on the effects of these substances on *Bacterium tumefaciens* and on crown galls in *Datura* it is concluded that: (1) thiouracil and uracil have no direct effect on *Bacterium tumefaciens* itself; (2) thiouracil reduces both newly developed and existing tumours; (3) thiouracil is often toxic to plants; (4) the action of thiouracil on tumours is inhibited by uracil when uracil is applied beforehand or simultaneously; (5) uracil by itself appears to stimulate crown gall.

3032. HILLS, K. L., BOTTOMLEY, W., AND MORTIMER, P. I.
Variation in the main alkaloids of *Duboisia myoporoides* R. Br. and *D. leichhardtii* F. Muell. II. *Duboisia myoporoides.*
Aust. J. appl. Sci., 1954, **5**: 258-75, from abstr. in *Biol. Abstr., Sect. D*, 1955, **29**, No. 9513.

Progenies of individual trees of *D. myoporoides* located throughout the area of distribution of that species were grown together under experimental conditions at one or more centres in S.E. Queensland or at Canberra, A.C.T. Total base and occasionally individual alkaloid contents were determined by a chromatographic method for samples taken over a number of years. Hyoscine, hyoscyamine, norhyoscyamine, and tigloidine (or alkaloids of the tigloidine group) were present together in all samples from progenies originating in the northern section of the area of distribution of the species. Hyoscyamine and norhyoscyamine were present, and hyoscine and alkaloids of the tigloidine group probably present in all samples from progenies of southern origin. Either hyoscyamine or norhyoscyamine was the major alkaloid in more than half the northern-type samples examined and in all the southern type. Hyoscine was the major alkaloid in many northern-type samples, but in the southern type usually comprised less than 10% of the bases. A wide range of alkaloid genotypes was evident in the relatively small sample of the population examined. However, environmental factors were found to be at least as important as genetic in determining the proportions of the several alkaloids. But genotypes were found in which hyoscine, hyoscyamine, and norhyoscyamine, respectively, remained the dominant alkaloid over a wide range of environmental conditions. [Authors' summary.]

3033. Hills, K. L., Bottomley, W., and Mortimer, P. I.
Variation in the main alkaloids of *Duboisia myoporoides* R. Br. and *D. leichhardtii* F. Muell. III. *Duboisia leichhardtii.*
Aust. J. appl. Sci., 1954, **5**: 276-82, from abstr. in *Biol. Abstr.*, *Sect. D*, 1955, **29**, No. 9514.

The alkaloid content of leaf samples from trees of *D. leichhardtii* growing in natural stands and under a variety of cultivated conditions was determined. Hyoscyamine, norhyoscyamine and hyoscine were found together in all samples of *D. leichhardtii* examined. Hyoscyamine ranged from 10 to 80% of the total bases, norhyoscyamine from 3 to 42% and hyoscine from 6 to 46%. There was evidence that seedling progenies differed in total bases and in yield of dry leaf, and that a selection programme should be effective in obtaining higher-yielding strains. [Authors' summary.]

3034. Hills, K. L., Bottomley, W., and Mortimer, P. I.
Variation in the main alkaloids of *Duboisia myoporoides* R. Br. and *D. leichhardtii* F. Muell. IV. Inter-specific hybrids.
Aust. J. appl. Sci., 1954, **5**: 283-91, from abstr. in *Biol. Abstr.*, *Sect. D*, 1955, **29**, No. 9515.

First generation hybrids between *D. leichhardtii* F. Muell. and the northern and southern sections of *D. myoporoides*, a second generation of the former cross, and selected individuals from progenies of naturally occurring trees intermediate in form between the parent species were studied under field conditions, and the total bases and individual alkaloids determined. Some of the F_1 clones of the cross *D. leichhardtii* × northern *D. myoporoides* were more vigorous in the early years of growth and produced a greater percentage of bases in their leaves than did either of the parent species. The hyoscine/hyoscyamine ratio varied considerably from clone to clone. A second generation from a hyoscyamine-type F_1 was segregated for total bases, dominance of either hyoscine or hyoscyamine, and a number of agronomic characters. There was evidence of transgressive segregation for total bases. The F_1 of the cross *D. leichhardtii* × southern *D. myoporoides* was similar in form and vigour to the cross with the northern section, but the total bases were not higher than those of the parent species. Hyoscyamine comprised over 80% of the total bases in two successive summers at Canberra, A.C.T. [Authors' summary.]

3035. Hills, K. L., Bottomley, W., and Mortimer, P. I.
Variation in the main alkaloids of *Duboisia myoporoides* R. Br. and *D. leichhardtii* F. Muell. V. Seasonal changes and some environmental factors.
Aust. J. appl. Sci., 1954, **5**: 292-7, from abstr. in *Biol. Abstr.*, *Sect. D*, 1955, **29**, No. 9516.

Changes in total bases in leaves of trees of *D. leichhardtii* and *D. myoporoides* were followed at monthly intervals over a 3-year period at Canberra, A.C.T. There was a progressive falling off from maxima in mid-January to minima about the following December, when new growth commenced. The total bases and the proportion of hyoscine in a clone of northern *D. myoporoides* were much the same when it was grown in the glasshouse in three contrasting types of soils. Sand culture trials with a line of *D. leichhardtii* showed that the total bases were not affected by subnormal levels of either P, K or N. In a further experiment in the glasshouse neither severe shading nor a period of drought substantially affected the alkaloid content of *D. myoporoides*. The bearing of these and of unpublished results upon the role of alkaloids in plant metabolism is discussed briefly. [Authors' summary.]

3036. Calastremé Cortejarena, A. M.
Estudio fitoquímico de tres especies argentinas del género *Ephedra*. **(Biochemical study of 3 Argentinian species of the genus *Ephedra*.)**
Rev. Invest. agric. B. Aires, 1951, **5**: 375-92, bibl. 30, illus. [received 1955].

Ephedra triandra and *E. tweediana* had very low ephedrine contents (0·031–0·040 and 0·018% respectively) and contained no tannins. *E. andina* contained tannins, probably of the pyrocatechol group, but no ephedrine.

3037. Navarro de Palencia, J.
Los ataques del *Fusarium* a la adormidera. **(*Fusarium* on opium poppy.)**
Bol. Inst. Invest. agron. Madrid, 1954, **14**: 377-81, illus.

In Spain the opium poppy is subject to attack by *Fusarium martii* (*F. cubense*) which may cause the loss of the whole crop in severe cases. The plants are attacked late in their growth cycle and the first symptoms, withering of the leaves, are soon followed by death. Control recommendations are: (1) avoid acid soils and in any case apply lime at 1,500–2,000 kg. per ha.; (2) avoid infected soil; (3) rotate; (4) use the Strubes or Mahnendorfer varieties in place of the susceptible Peragis.

3038. Boutique, R., and Monseur, X.
Les alcaloïdes du genre "*Rauvolfia*" et l'étude botanique de ses espèces au Congo belge. **(*Rauvolfia:* the alkaloids of the genus and a botanical study of the species in the Belgian Congo.)** [Flemish summary ½ p.]
Bull. agric. Congo belge, 1955, **46**: 271-80, bibl. 32, illus.

Descriptions of 8 species of *Rauvolfia* [or *Rauwolfia*] found in the Congo are supplemented by a key and illustrations of leaves and inflorescences. Twenty-four alkaloids found in the genus are classified according to type, and the species in which each has been found are indicated.

3039. WAN, A. S. C.
The pharmacognosy of *Rauwolfia perakensis*.
J. Pharm. and Pharmacol., 1955, **7** (3): 167-76, bibl., illus., from abstr. in *Trop. Abstr.*, 1955, **10**, No. c804.

The macroscopical and histological characters of roots and rhizomes of *Rauwolfia perakensis* are described. *R. perakensis* has been shown to be distinguishable from *R. serpentina* on the basis of cell measurements and also by the presence of sclerenchymatous elements.

3040. GILLOT, J.
Quelques observations sur la récolte, dans les friches, de racines de *Rauvolfia vomitoria* Afz. (**Some notes on harvesting *Rauvolfia vomitoria* roots in young forest regrowth.**)
Bull. Inf. INEAC, 1955, **4**: 83-8, illus.

In trials at Yangambi on digging up roots of *R. vomitoria* in forest regrowth for alkaloid extraction yield was found to depend on the age and composition of the regrowth and on the type of soil. The roots were harvested by a team of 4 equipped with one pincer-type, hand-operated cassava lifter. The method of drying the roots is also described.

Essential oils.

(*See also* 3030, 3069s, 3369y.)

3041. HANDA, K. L., KAPOOR, L. D., AND CHANNA, O. N.
A preliminary note on the essential oil bearing plants of Kashmir. (Part V.)
Indian J. agric. Sci., 1955, **25**: 73-8, bibl. 5.

The contents and properties are given of the essential oil found in local material of 13 species. The plants include 5 conifer spp., 2 *Eucalyptus* spp., 3 *Ocimum* spp., *Mentha viridis*, *Cinnamomum camphora* and *Magnolia grandiflora*. [See also *H.A.*, 24: 4015.]—Drug Res. Lab., Jammu.

3042. HOCKING, G. M., AND EDWARDS, L. D.
Cultivation of peppermint in Florida.
Econ. Bot., 1955, **9**: 78-93, bibl. 34.

Field experiments at Gainesville, Fla, conducted between 1927 and 1942 and here described, indicate that the growth of peppermint in this region is erratic, and this, coupled with other disadvantages, suggests that the commercial cultivation of peppermint would not be practicable.

3043. HORNER, C. E.
Control peppermint diseases.
Stat. Bull. Ore. agric. Exp. Stat. **547**, 1955, pp. 14, illus.

Control measures are prescribed for mint rust (*Puccinia menthae*), verticillium wilt (*Verticillium albo-atrum*), root nematodes (*Longidorus sylphus*, *Meloidogyne hapla*, *Paratylenchus macrophallus*) and fungal root rots.

3044. CAMPBELL, L.
Control of mint rust by premerge treatment with dinitro amine.
Down to Earth, 1955, **10** (4): 6-7.

Attempts to control mint rust, *Puccinia menthae*, with fungicide dusts during the growing season were discouraging, but pre-emergence herbicidal sprays for the combined control of the disease and annual weeds showed promise. The alkanolamine salt of DNOSBP was among the best materials tested. In the experiments described it was applied at approximately 3 lb. in 40 and 60 gal. per acre at about the time the mint was starting to emerge. In 1952 in 3 treated plots no aecial galls were found, whereas in the controls an average of 3 galls per plot were found. In these plots the dinitro amine reduced the number of annual weeds by 97·3% and increased the yield of mint hay by 27·4%. In 1953 and 1954 the treatment reduced rust pustules at harvest by 96% compared with the controls. [See also *H.A.*, 25: 1852.]—Western Washington Exp. Stat., Puyallup.

3045. IVANOFF, D., IVANOFF, T., AND STOÏANOVA-IVANOVA, B.
Sur la composition du stéaroptène de l'huile de roses bulgare. II. Autres hydrocarbures satures que l'eicosane. (**The composition of the stearoptene of Bulgarian rose oil. II. Other hydrocarbons apart from eicosane.**) [Russian summary 4 lines.]
C.R. Acad. bulg. Sci., 1954, **7** (1): 17-20, bibl. 3.

In addition to eicosane the stearoptene of Bulgarian rose oil contains heneicosane, nonadecane, heptadecane and probably pentadecane. [See also *H.A.*, 24: 4018.]

3046. IVANOFF, D., AND MARÉCOFF, N.
Sur la composition de l'huile de roses bulgare. (**The composition of Bulgarian rose oil.**) [Russian summary 7 lines.]
C.R. Acad. bulg. Sci., 1954, **7** (1): 13-15, bibl. 14.

Three methods of analyses have confirmed that the major constituent of Bulgarian rose oil is not geraniol, as reported by earlier workers, but citronellol, which occurs in amounts exceeding 45%.

Fibres.

(*See also* 2927, 3069g, k, l, q, v, 3243, 3246, 3386.)

3047. RAGAZZI, G.
La semente di canapa. (**Hemp seed.**)
Ital. agric., 1955, **92**: 216-22, bibl. 2, illus.

The attributes of good hemp seed are enumerated. In Italy seed can be produced either by growing on selected plants in an ordinary crop or by raising a special seed crop. Harvesting, preparation and grading are discussed and diagrams of a rotary grader are presented.

3048. BORTHWICK, H. A., AND SCULLY, N. J.
Photoperiodic responses of hemp.
Bot. Gaz., 1954, **116**: 14-29, bibl. 20.

Flowering of hemp, *Cannabis sativa*, variety Kentucky, occurred in all plants at photoperiods of 8–14 hours, inclusive. At photoperiods of 16–20 hours flowering was incomplete and greatly delayed. Seedling plants

3–5 weeks old flowered within about 2 weeks when shifted from 16-hour to 8-hour photoperiods. Five-week-old plants required fewer 8-hour photoperiods than did 3-week-old plants for equal promotion of flowering. When one branch of a two-branched plant was subjected to short photoperiods, the production of flowers was restricted to that branch. Temperatures as low as 55° F. applied during the dark periods did not inhibit flowering. Intensities of light from an incandescent filament lamp greater than 0·03 f.c. inhibited flower-bud initiation when applied daily during the 16-hour periods between successive 8-hour periods of natural light outdoors. Studies were also made on the effect of pollinating female plants with pollen from male flowers produced on female plants, the effects of nitrogen, light intensity, photoperiod and temperature on the production of male flowers on female plants, and differences between female lines in tendency to form male flowers. [From authors' summary.]—U.S. Dep. Agric., Beltsville, Md.

3049. TANGANYIKA SISAL GROWERS' ASSOCIATION (LOCK, G. W., AND OTHERS).
Annual Report of the Sisal Research Station, Mlingano, Ngomeni, 1953, 1954, pp. 56.

A full account is given of research in progress. *Field trials in the station.* In addition to trials described in the previous report [see *H.A.*, 25: 1864] these include: The results of the cultivation trial started in 1936 "point to the necessity of weeding young sisal, whatever the fertility status of the soil may be, for rapid initial growth and for the recovery of a high proportion of the potential number of leaves for crop. On the other hand, the dangers of clean weeding are stressed and it is imperative to maintain a cover on the soil. This by itself, however, is insufficient to arrest a deline in yields under a system of continuous cropping with sisal." Spacing trial: fibre yields are reduced when densities are less than 4,000 per ha. Spacing×cutting trial: heavy cutting, i.e. leaving 8 as compared with 16 or 24 leaves, has reduced yields by 15%. Grass rotational and manurial trial: growth appears to be best following elephant grass manured with NPK. Factorial manurial trial: Ca and P, in the absence of N, have had only a small effect on the rate of unfurling of new leaves; N, however, has had a pronounced effect especially at the highest rate of application; K has had no effect. Interplanting trial: in the first 3 cuts sorghum significantly reduced fibre yields, but none of the other crops or factors had any effect. Permanent bulbil nursery manurial trial: the results confirmed those previously obtained. Bulbil nursery manurial trial: a new trial was started to compare sisal waste, grass, and bitumenized paper as mulches coupled with deep and shallow cultivation, liming and no liming, and NP and no NP. Nitrogen fertilizer trial: ammonium sulphate, which increases acidity in certain soils and thus accentuates chlorotic mottling, is being compared with other forms of nitrogen. Lime placement trial: Ca having markedly stimulated new rooting in bulbil plants in a water culture experiment, the effect of placing ground limestone in bands on the rows before planting is being studied. Soil acidity trial: the effects of ground limestone or gypsum dressings on chlorotic mottling are being studied. Spraying experiment: dieldrin greatly reduced damage by *Scyphophorus acupuntatus* larvae. *External trials.* Spacing×cutting trials—Central Line: the Kilosa trial has been replaced by a land preparation method×mulching×fertilizer trial. Grass rotational × manurial trial—Tanga Coast: growth was better on plots rested under grass with fertilizer dressing than on continuously cropped plots similarly dressed. Banding disease manurial trial—Tanga District: K plots are free from disease and current fibre yields in response to 1,100 lb. potassium sulphate per ha. applied at intervals during the first 5 years of the crop are 62% higher than those of no-K plots. *Plant physiology.* Leaf analyses of samples from manurial trials show that (1) uptake of NPKCa reflects the application of the respective fertilizers; (2) uptake from sisal waste of P greatly, and of NCa to a lesser extent, exceeds that from the corresponding inorganic fertilizers; (3) N as ammonium sulphate restricts P uptake considerably and Ca uptake to a lesser degree; (4) ammonium sulphate is conducive to chlorotic mottling which is always associated with low leaf Ca; (5) chlorotic mottling is invariably accompanied by very high leaf Mn. Water culture: the leaf symptoms of N, P, K, Ca, and Mg deficiencies and the effect of acidity on rooting were studied. Sand culture: leaf deficiency symptoms as above, toxicity of Fe, Mn, Cu, Co and Mo, and NPKCa nutrition were studied. *Soil chemistry:* studies relating to banding disease are described. *Fibre studies* were abandoned because no relationship between fibre fineness and manurial treatment could be established.

3050. ROLET, R.
Le genêt d'Espagne dans le département de l'Hérault. **(Spanish broom in the Department of Herault.)**
Progr. agric. vitic., 1955, **143:** 145-54, bibl. 9.

Spanish broom (*Spartium junceum*) grows wild and is also cultivated on a small scale in Herault. A factory has been opened for the manufacture of conveyor belts for mines from the fibre. Spanish broom culture is suggested as an alternative to vine growing.

Hops.

(*See also* 3069h.)

3051. INSTITUTE OF BREWING.
Annual Report of the Institute of Brewing.
J. Inst. Brew., 1955, **61**: 81-117.

The report includes brief notes on investigations in progress at the Brewing Industry Research Foundation on the influence of drying conditions on the brewing quality of machine-picked hops, the role of sulphur in drying and hop chemistry.

3052. ASKEW, H. O., HODGSON, J., AND WARD, G.
The effect of position on the bines, of fertilizers, and of season on the mineral and nitrogen contents of hop leaves and cones.
N.Z. J. Sci. Tech., Sect. B, 1955, **36:** 495-510, bibl. 5.

Leaves and cones from hop gardens have been sampled over the seasons 1950–53. The mineral and nitrogen content of leaves was greatly influenced by position on the plant, the younger leaves being richer in phosphorus, potassium and nitrogen, but poorer in calcium, magnesium and silica, than older ones. Increasing the rate of application of a standard fertilizer mixture had little effect on mineral and nitrogen content except for increases in the soluble ash and potash contents of the dry matter. Heavy applications of sulphate of potash significantly increased the potash contents of leaves and cones, and decreased the magnesia content of the leaves but not of the cones. Seasonal effects, except for nitrogen and magnesia, were small. For 28 samples from the Motupiko soil series, there was a highly significant negative correlation (0·1%) between potash and magnesia content of the leaves, but no relationship was found between potash and magnesia content of the cones. A significant correlation (1%) was found between potash content of leaves and cones, but there was no significant relation between magnesia content of leaves and cones. Data for dry matter production and mineral nitrogen intake show that the equivalent of large amounts of fertilizer is absorbed by hop plants. Since the cones represent nearly half of the dry weight of the plant their removal as the harvestable crop represents an appreciable annual drain on the nutrient supply of the soil, which is required to be made good by application of fertilizers. [Authors' summary.]—Cawthron Inst., Nelson.

3053. Chater, G. P., and Jary, C. L.
Report on hop picking by machine.
[*Publ.*] *Wye Coll.*, [1955?], pp. 26, bibl. 8.

This paper is a summary of the results—already published in detail in the annual reports of the Department of Hop Research, Wye College [see *H.A.*, 21: 3788, 23: 941, 23: 3282 and 24: 4047]—of surveys conducted in the period 1949/53. The following aspects of the subject are discussed: general description of a picking machine, types of machine, notes on the operation of a standing machine, output and machine capacity, wastage, drying machine-picked hops, machine picking in relation to progressive wilt disease, and growing hops for the machine.

3054. Lewis, J. C., Carson, J. F., and Alderton, G.
Some studies of hop resin components including the spectrophotometric determination of humulon and lupulon. [French and Spanish summaries ½ p. each.]
Wallerstein Lab. Commun., 1955, **18**: 33-47, bibl. 67.

An investigation of hops was undertaken in the hope, which was not realized, that new uses might be found for hops or hop constituents, particularly with regard to therapeutic possibilities of the hop resin components, lupulon and humulon. A description is given of a rapid spectrophotometric procedure which was developed in the course of these studies, and of procedures employed for pilot-scale isolation of humulon and lupulon for the therapeutic tests. The chemistry of humulon, lupulon and other hop resin constituents is discussed.—U.S. Dep. Agric., Albany, Calif.

3055. Howard, G. A., Pollock, J. R. A., and Tatchell, A. R.
The chemistry of hop constituents. Part VII. Colupulone.
J. chem. Soc. Lond., 1955, pp. 174-81, bibl. in text.

The major constituent of the β-soft resin of some varieties of English hops has been shown to be the hitherto unrecognized colupulone. The degradations of this compound by hydrogenolysis, alkaline hydrogen peroxide, acid, and alkali are described and the results are compared with those obtained with lupulone. New structures are proposed for lupuloxinic acid and its degradation products. Degradations of synthetic lupulone and colupulone confirm the various structures put forward. [From authors' summary.]

Insecticidal plants.

(*See also* 3069b, d, m.)

3056. Notcutt, L. A.
Oil-gland count as an approximate means of evaluating pyrethrum flowers.
Chandler, S. E.
Observations on Lt.-Col. Notcutt's article on "oil-gland count".
Pyreth. Post, 1955, 3 (4): 9-14, bibl. 1, and 15.

An account is given of the development of a rapid method of making oil-gland counts on pyrethrum achenes as an aid to breeding pyrethrin-rich strains. Dr. Chandler, discussing the scientific background of the question, points out that the contents of the secretory ducts are probably more significant quantitatively than those of the oil-glands, but that the dissections necessary to display the former are relatively difficult and time-consuming.

Rubber plants.

3057. Sívori, E. M., and Caso, O. H.
Contenido de caucho en plantas de la flora argentina. (**Rubber content of Argentinian plants.**)
Rev. Invest. agric. B. Aires, 1952, **6**: 157-65, bibl. 6 [received 1955].

Eighty-one Argentinian plants of the families Euphorbiaceae, Compositae, Apocynaceae and Asclepiadaceae were examined. Twenty-two were found to contain rubber. They belonged to the genera *Euphorbia* (11), *Ficus* (1), *Hypochoeris* (4), *Jatropha* (2), *Morrenia* (2), *Philibertia* (1) and *Vallesia* (1). *Euphorbia portulacoides* had the highest content, 3%.

Seed oils.

(*See also* 3069r, 3245.)

3058. Kartha, A. R. S., Sethi, A. S., and Gulati, K. C.
Rapid estimation of yield and iodine value of oils in small samples of oilseeds.
Indian J. agric. Sci., 1955, **25**: 79-84, bibl. 8.

A method is described whereby the yield and iodine value of oil in a 0·3–0·5 g. sample of seed can be determined simultaneously in about 2 hours. The method is based on the use of carbon tetrachloride as solvent. Yield of oil is determined gravimetrically and iodine value by the Hanus method. [From authors' summary.]—Indian agric. Res. Inst., New Delhi.

3059. Krishnamachar, V. S., and Ramachandran, B. V.
L-histidine content of some oilseed cakes.
J. sci. industr. Res., India, 1954, **13B**: 815-16, bibl. 4.

Including those of water melon, holoptelea, til (*Sesamum indicum*), tobacco, keteli (*Argemone mexicana*), sunflower, linseed, castor, coconut, mustard, safflower and kamala (*Mallotus philippinensis*).

3060. Ramos Núñez, G.
La higuerilla (*Ricinus communis* L.). Apuntes sobre esta planta. (**Notes on the castor bean plant.**)
Not. agron. Palmira, 1952, **5**: 49-70, bibl. 6, illus. [received 1955].

Subjects discussed include varieties in Colombia especially the Leal series, climate, maturation period, soils, culture, harvesting, drying, shelling, ratoon crops, manuring, diseases and pests, yields and production costs.

3061. Singh, D.
Castor—its genetics, breeding and culture.
Agric. Anim. Husb. U.P., 1954, **5** (4): 3-36, bibl. 83, illus.

Subjects discussed include distribution and production in India, morphology and genetics, pollination, cytology and oil content, varieties, culture, diseases and pests and their control.

3062. Clavier, C.
Note sur les travaux d'amélioration du ricin au Maroc. (**Notes on castor selection in Morocco.**)
Terre maroc., 1955, **29**: 79-83.

After an account of genetical studies on Moroccan and introduced castor varieties the results are given of yield and cultural trials on mass-selected local and Palestinian perennial varieties and of trials of selected annual varieties of French, Palestinian, United States and Brazilian origin under both irrigated and dry culture. At Rabat the best Moroccan perennials—Oued Beth, Rouge de Fès and Saïdin—gave 10·5–10·9 quintals of beans per ha. and the best Palestinian varieties—31 CRA and Aconyi—only 9·0 and 7·5 respectively. At Rabat the earliest-maturing annuals gave the lowest yields and the latest the highest; Conner, the latest variety tested, with a 212-day growth cycle, gave three times the yield of Anjou, the earliest variety tested, which has a growth cycle of only 120 days. Other promising annuals tested were the U.S. varieties Blackwell and Cimarron. Spacing, resistance to frost and scald, dehiscence and manuring are also discussed.

3063. Rautou, S.
Essai de ricin en Languedoc (1954). (**Castor bean trial in Languedoc, 1954.**)
Progr. agric. vitic., 1955, **143**: 232-43, bibl. 26.

The possibility of growing the castor-oil plant as an annual crop in France is discussed. Following a review of the literature on the culture of castor beans, a cultural trial is described in which 6 varieties were grown at Montpellier in 1954. Seeds were sown at the beginning of May in rows 80 cm. apart and at 40 cm. or 50 cm. in the rows. The early-flowering varieties, Baker and Anjou, continued to branch until the first frosts, but the late varieties, Conner and Oued Beth, only matured 1 inflorescence. At the 40 cm. spacing, there was less branching than at 50 cm. particularly with Blackwell (semi-early) and Cimarron (semi-late). At the closer planting, the number of seeds produced by Cimarron, Conner and Oued Beth was reduced. Yields of Blackwell, Cimarron, and late varieties were equal to, or better than, those of the early varieties. In general seed number per inflorescence was greatest on the primary inflorescence. Late varieties showed a tendency to drought susceptibility. All varieties produced a certain percentage of barren seeds. The author suggests that late varieties are more interesting from the point of view of ease of harvesting, and discusses the economic aspects of oil production.

3064. Gvozdeva, Z. V.
Methods of grafting sunflower and castor bean plants. [Russian.]
Zemledelie, 1954, **2** (11): 82-6, illus.

For grafting very young castor bean plants still in the cotyledonary stage, keeping the seedlings in a test tube filled with water is most suitable for greenhouse operation and using potted seedlings for outdoor work. Older plants both under glass and in the field can be successfully grafted by the approach method or by budding.

3065. Venning, F. D.
The reciprocal effects between calcium and phosphate ions upon the growth, composition, and structure of castor bean, *Ricinus communis* L.
J. Wash. Acad. Sci., 1954, **44**: 65-82, bibl. 28, illus.

Deficiencies of Ca and P did not affect the basic anatomical pattern of castor bean, but were reflected in the amounts of the tissue produced. A deficiency of either one of these elements had a greater adverse effect on the plant than a deficiency of both. The effects of Ca and P deficiency were more profound when plants were in the reproductive stage than in the vegetative stage. Both deficiencies restricted the activity of the vascular cambium, and the differentiation of secondary conducting and mechanical tissues in the axis. Ca deficiency resulted in a smaller number of cells per internode than in the controls, while P deficiency increased the cell number in the internodes; a deficiency of both gave cell numbers intermediate between those of the controls and of P deficiency. The phosphate ion appeared to be toxic to meristematic cells when not associated with Ca. Ca apparently had a stimulating effect on cell division which was somewhat curtailed when associated with P. Both elements appeared to be necessary for cell elongation.—Univ. Miami.

3066. Bogdaševskaja, O. V.
Physiological conditions of ricinine biosynthesis. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **99**: 853-4, bibl. 7.

Two experiments with castor bean plants, briefly described, show that ricinine formation is favoured by the intensive growth of organs and the ample supply of assimilates to them and that the precursor of ricinine is lysine.

3067. Kasturi, T. R., and Iyer, B. H.
Fixed oil from *Elettaria cardamomum* seeds.
J. Indian Inst. Sci. Sect. A, 1955, **37**: 106-12, bibl. 11.

The mixed fatty acids of the fixed oil from *Elettaria* *cardamomum* seeds have been shown to consist of: caprylic and caproic (0·3%), palmitic (8·4%), stearic (18·3%), oleic (62·6%) and linoleic (10·5%) acids. The unsaponifiable matter obtained from the oil has been shown to consist of a sterol, probably β-sitosterol. [From authors' abstract.]—Indian Inst. Sci., Bangalore.

Waxes.

(*See also* 3069c.)

3068. MARKLEY, K. S.
Caranday—a source of palm wax.
Econ. Bot., 1955, **9**: 39-52, bibl. 10, illus.

The caranday, *Copernicia australis*, which occurs mainly in Paraguay, is a waxy-leaf palm similar to the carnauba palm, *C. cerifera*, of Brazil. Selected leaves yield 3·8–4 g. of clean wax. Botany, pilot-plant production and prospects are discussed [see also *H.A.*, 25: 797].

Noted.

3069.

a BROWN, E., COOMES, T. J., AND PICKERING, G. B.
Black pepper from Nigeria.
Colon. Plant Anim. Prod., 1954, **4**: 320-8.
Analysis and commercial prospects [see *H.A.*, 25: 1887d for data on earlier sample.]

b BROWN, N. C., AND PHIPERS, R. F.
The analysis of pyrethrins. Part I. Errors arising during the examination of partially degraded materials.
Pyreth. Post, 1955, **3** (4): 23-6.

c CHARLSON, A. J., NUNN, J. R., AND STEPHEN, A. M.
The composition of *Acacia cyanophylla* gum.
J. chem. Soc. Lond., 1955, pp. 269-73, bibl. in text.

d CROMBIE, L.
Amides of vegetable origin. Part III. Structure and stereochemistry of *neo*herculin. Part IV. The nature of pellitorine and anacylin.
J. chem. Soc. Lond., 1955, pp. 995-8, 999-1006, bibls in text.
Insecticidal principles of *Zanthoxylum clava-herculis* and *Anacyclus pyrethrum* respectively.

e GENTRY, H. S.
Apomixis in black pepper and jojoba?
J. Hered., 1955, **46**: 8, bibl. 3.
Pistillate plants of *Piper nigrum* and *Simmondsia chinensis* fruited freely.

f JARDIM, J. R. DA S.
Il miristato di isopropile e le sue applicazioni anche farmaceutiche. II. Preparazione partendo dal grasso di ucuúba. **(Isopropyl myristate and its pharmaceutical and other uses. II. Preparation from ucuuba [*Virola* spp.].)**
Olearia, 1954, **8**: 243-51, bibl. 127.

g JARMAN, C. G., AND KIRBY, R. H.
***Abutilon longicuspe* fibre from Kenya.**
Colon. Plant Anim. Prod., 1954, **4**: 329-30.
Tests on sample submitted as a possible jute substitute.

h JARY, C. L.
The new varieties of hops.
Agriculture, Lond., 1955, **62**: 30-4.
Discussed with particular reference to verticillium wilt and machine picking [see also *H.A.*, 25: 770].

i KLOHS, M. W., DRAPER, M. D., AND KELLER, F.
Alkaloids of *Rauwolfia serpentina* Benth. V. Rescinnamine.
J. Amer. chem. Soc., 1955, **77**: 2241-3, bibl. 12.

j LASSER, T.
Plantas venenosas de la familia del tártago. **(Poisonous plants of the castor family.)**
Agric. venezol., 1954, **19** (173): 22-3, illus.
Ricinus communis, *Jatropha curcas*, *Hura crepitans* and *Hippomane mancinella*.

k LUČNIK, Z. I.
Material for frame mats. [Russian.]
Sad i Ogorod, 1955, No. 1, p. 78.
From the stems of *Miscanthus sacchariflorus*.

l MAGEE, C. J.
Report on a plant virus disease survey in the Territory of Papua and New Guinea—Part I. (Manila hemp.)
Report of survey of virus diseases of food crops in the Territory of Papua and New Guinea with special reference to plant quarantine—Part II.
Papua N. Guinea agric. Gaz., 1954, **8** (4): 12-27, bibl. 17, illus; **9** (1): 17-26, bibl. 15, illus.
Prospects for Manila hemp considered fairly good. Part II includes vegetables.

m PARKIN, E. A.
A comparison of chemical and biological assays of three samples of pyrethrum flowers from Tanganyika.
Pyreth. Post, 1955, **3** (4): 18-22, bibl. 6.
Results justify distribution of strain U/11 for cultivation in S. Tanganyika.

n PHILLIPS, D. D., AND CHADHA, M. S.
The alkaloids of *Rauwolfia serpentina* Benth.
Chem. Ind. Lond., 1954, No. 15, pp. 414-15, bibl. 15.
Ambiguities in nomenclature.

o RANGASWAMI, S., AND RAO, E. V.
Occurrence of lycorine in the bulbs of *Crinum latifolium* Linn.
Curr. Sci., 1955, **24**: 25, bibl. 1.

p RAO, J. B., NAYUDAMMA, Y., AND DAS, B. M.
A survey of the indigenous tanning materials of the Madras State: Part I—White-valem bark (*Acacia leucophloea*).
J. sci. industr. Res., India, 1954, **13B**: 867-73, bibl. 10, illus.
A satisfactory substitute for wattle bark.

q SCARPA, G.
Aspetti economici della canapicoltura in Italia. **(Economic aspects of hemp growing in Italy.)**
Agric. Venezie, 1955, **9**: 132-42, bibl. 2.
Acreage, production, costs, prices, exports.

r SETHI, S. C., AND AGGARWAL, J. S.
Component fatty acids of the oil from the seeds of *Benincasa cerifera* Savi.
J. sci. industr. Res., India, 1954, **13B**: 853-4, bibl. 6.

s SHIMOKORIYAMA, M., AND HATTORI, S.
On the formation of carthamin in the flowers of *Carthamus tinctorius*.
Arch. Biochem. Biophys., 1955, **54**: 93-101, bibl. 9.

t SRINIVASAN, M., AND OTHERS.
Production of fructose syrup from *Agave vera cruz* Mill.
J. sci. industr. Res., India, 1954, **13B**: 874-8, bibl. 30.
From the stem.

u STOLL, A., AND HOFMANN, A.
Canescine and pseudoyohimbine from the roots of *Rauwolfia canescens* L.
J. Amer. chem. Soc., 1955, **77**: 820-1, bibl. 5.

v WANLESS, G. G., KING, W. H., Jr., AND RITTER, D. D.
Hydrocarbons in pyrethrum cuticle wax.
Biochem. J., 1955, **59**: 684-90, bibl. 25.
From the flowers.

w WILDMAN, W. C., AND KAUFMAN, C. J.
Alkaloids of the Amaryllidaceae. III. Isolation of five new alkaloids from *Haemanthus* species.
J. Amer. chem. Soc., 1955, **77**: 1248-52, bibl. 12.
Several *Haemanthus* spp. are used in South African native medicine.

FLORICULTURE.

General.

(*See also* 2403, 2766, 2767, 2797, 3159a, c-g, o, u, 3160b, c, e, i, j, 3390, 3394, 3408g.)

3070. GARTHWAITE, J. M.
Flower section.
Rep. Luddington exp. Hort. Stat. for 1953, 1954, pp. 49-58.

The report includes information on: *Dahlia:* testing stocks for virus; varieties for market. *Gerbera:* preliminary results from a pH and fertilizer trial have shown that plants in the most alkaline soil were smaller and less vigorous than those at other pH treatments; there was some indication of weakness in plants lacking phosphate. *Chrysanthemum maximum:* variety trial. *Delphinium:* a spacing trial showed that yield per acre from a 12-in. spacing was 3 times greater than that from a 24-in. spacing. *Wallflower:* a seed rate of 1 oz. per 350 or 550 yd. drill gave earlier and higher-yielding plants than a seed rate of 1 oz. per 2,000 yd. drill. *Iceland poppy:* it proved unnecessary to treat stems in any way before marketing; the best time for cutting was the split calyx stage. *Observation studies* on asparagus, antirrhinums, iceland poppies, heuchera, polyanthus and michaelmas daisies.

3071. SCHALT, W.
Über die Beziehung zwischen Anbau und Umsatz im Zierpflanzenbau. **(On the planning of ornamental plant production in relation to turnover.)**
Festschr. 25 jähr. Bestehen gärtn. Hochschulstud. Deutschland, 1954/55, pp. 165-73.

The turnover of nurseries is subject to considerable fluctuation. The author evolved a statistical method which could be used by a central authority to advise producers how to adjust supplies of ornamental plants to the demands of the market in a given area and thus stabilize their returns.—Tech. Univ., Berlin-Charlottenburg.

3072. ANDREASEN, R. C.
Mist.
Flor. Exch., 1955, **124** (18): 12.

The advantages of propagating cuttings under mist are discussed and information is given on types and placement of nozzles and systems of control for interrupted mist. The use of mist has been of particular value in rooting carnation cuttings removed from dry cold storage. In addition to its use in propagation, mist has been used to increase the number of breaks in roses. Other possible applications are suggested.

3073. BRANDSTAETTER, M. (HESS, C., Jr.).
Mist propagation reviewed during Lake County School.
Amer. Nurserym., 1955, **101** (7): 52-9.

Recent work done at Cornell University on propagation under interrupted mist is reviewed. Subjects discussed include selection of nozzles, installation, methods of controlling the mist period and solenoid valves. [See also *H.A.*, 25: 1954.]

3074. WELLS, J. S.
Where do we stand on the use of mist?
Amer. Nurserym., 1955, **101** (5): 17, 108-15, illus.

The use of a fogline inside a greenhouse benefits almost all types of plant propagation. The most suitable type of jet for indoors appears to be the Monarch H-261. For outdoor rooting of cuttings a much coarser type of jet, similar to the Florida jet, is the best. On a site fully exposed to the sun, having good drainage and some wind protection, in beds filled with sharp sand for most species and a 50: 50 mixture of sand and peat for certain others, good rooting should occur in 3 to 6 weeks. The great advantage of this type of propagation is that really soft cuttings can be taken quite early in the season and made to root rapidly and produce established plants for overwintering.

3075. Chaminade, R.
Cultures florales en solution. (**Soilless culture of flowers.**)
Ann. agron., 1954, **5**: 729.

The composition is tabulated of a nutrient solution which has given very good results in the sand culture of roses, carnations and arums. Work is in progress on the soilless culture of bulbs.—Versailles.

3076. Penningsfeld, F.
Einfluss der Düngungshöhe auf die Nährstoffaufnahme von Zierpflanzen. (**The effect of rate of manuring on the uptake of nutrients by ornamental plants.**)
Festschr. 25 jähr. Bestehen gärtn. Hochschulstud. Deutschland, 1954/55, pp. 131-43.

The following results were obtained in nutritional experiments with 9 ornamental plants (*Adiantum fragrans*, *Anthurium scherzerianum*, *Primula obconica*, cyclamen, gloxinia, *Aechmea fasciata*, *Asparagus sprengeri*, *Azalea indica*, *Vriesia splendens*) designed to determine the effect of increasing the concentration of the nutrient solution on development and nutrient uptake: (1) With all plants grown in sand culture the nutrient content of the dry matter rose with an increase in the osmotic pressure of the nutrient solution. Within the range of 0·3–1·6 atm. the content of the nutrients studied (N, P_2O_5, K_2O, CaO, MgO) increased to 134·8% of that in plants grown in the weakest solution. The reactions of individual species varied, but the tendency was similar in all. (2) In the sand culture experiments the uptake of N, P_2O_5 and K_2O showed a marked relative rise, while the CaO content decreased and MgO did not respond uniformly. In 2 soil culture experiments, undertaken for comparison, MgO showed a distinct increase, but otherwise the trend was the same. These findings suggest that too high a concentration may cause relative CaO deficiency and possibly also MgO deficiency. (3) As a result of the rise in K and the fall in Ca uptake with increase in osmotic pressure the K_2O: CaO ratio rose more or less markedly. The same was true of the K_2O: MgO ratio, even where Mg uptake was promoted by higher concentrations. Equally the CaO: MgO ratio was shifted in favour of Mg with a rise in osmotic value. (4) The N: P_2O_5: K_2O ratio fluctuated in accordance with the different responses of individual nutrients to a rise in concentration of the solution, but only in exceptional cases did these fluctuations exceed the limits characteristic of a species. (5) Optimum yields generally coincided with maximum uptake of nutrients, but N, P and K uptake occasionally rose above the point of highest yields if calculated on a per-plant basis. The uptake of Mg ran parallel with the yield curve, while in several cases the uptake of Ca reached its peak below the point of optimum yields. (6) The data on content and ratio of nutrients obtained in the best series of the pot trials provide valuable clues for estimating the particular requirements of individual species. [From author's summary.]—Lehr- u. Forschungsanst. f. Gartenbau, Weihenstephan.

3077. Mahlstede, J. P.
From boxes to polyethylene.
Amer. Nurserym., 1955, **101** (6): 9, 116-25.

Methods of packaging retail nursery stock over the last few decades are reviewed, special attention being paid to modern development in the handling of hardy chrysanthemum and evergreen plants. [See also *H.A.*, 25: 1958.]

3078. Westcott, C., and others.
Pests and diseases of ornamentals, plants and lawns. Control by insecticides and fungicides.
Brooklyn bot. Gdn Rec., 1955, **11**: 3-97, illus., obtainable as a separate price $1.

The whole of the spring issue of the journal is devoted to the control of enemies of ornamental plants by the amateur. Articles on insecticides, miticides and fungicides give background information. Further information is given in articles on pests of shrubs, roses, irises, daylilies and lawns, and diseases of roses, bulbs and foliage plants. A note is given on materials and equipment, and also an index, with symptoms, of the pests and diseases covered in this handbook.

3079. Williamson, C. E.
Soil-borne disease control with chemicals.
Down to Earth, 1954, **10** (3): 6-8, illus.

Fumigation with methyl bromide, chloropicrin, CBP (chloro-bromo-propene) and formaldehyde controlled soil-borne diseases in greenhouses as effectively as steam. Methyl bromide fumigation of sand and potting soil gave good control of *Pythium* blackleg of geraniums without causing plant injury. The bromine-containing fumigants leave, however, some residue, probably bromide, which adversely affects carnation plants [see also *H.A.*, 24: 1755] and the germination of seeds of such plants as snapdragon and salvia. Investigations on methyl bromide injury continue.—Ornamentals Lab., Cornell Univ., Farmingdale, N.Y.

Annual and herbaceous plants.

(*See also* 2344, 2375, 2695, 2818, 3159b, h, j, m, p, v, x, y, 3160k, l.)

3080. Bestagno, G., and Santocchia, A.
Saggi di fitotossicità di prodotti acaricidi su *Asparagus plumosus* Baker, *Asparagus sprengeri* Reyel e *Viola odorata* L. (**Acaricide phytotoxicity tests on *Asparagus plumosus, A. sprengeri* and *Viola odorata*.**)
Riv. Ortoflorofruttic. ital., 1955, **39**: 33-43, bibl. 8.

Tests showed that: (1) the acaricide Aramite is very phytotoxic to the 2 *Asparagus* spp., both as an emulsion and as a wettable powder; (2) the systemic insecticides Pestox 66 and Systox are not phytotoxic; (3) among the thiophosphates malathion is very phytotoxic, especially to *A. plumosus*, parathion is toxic only to *A. plumosus* and at high concentrations and diazinon is not phytotoxic; (4) Ovotran and the ovicide formulation of Murvesco (parachlorophenylbenzenesulphone) are not phytotoxic either as emulsions or as wettable powders; but (5) the acaricide-ovicide formulation of Murvesco is very phytotoxic, either as an emulsion or a wettable powder, especially to the *Asparagus* spp. For the plants in question the ovicides recommended are Murvesco and Ovotran and the acaricides recommended are parathion and diazinon, provided that parathion is not used on *A. plumosus* at over 30–35 g. liquid concentrate per hl.—Osserv. fitopat. Sanremo.

3081. Unger, K.
Bodenfeuchtigkeit und Asternwelke. **(Soil moisture and aster wilt.)**
Angew. Meteor., 1953, **1**: 278-80, from abstr. in *Z. PflKrankh.*, 1955, **62**: 255.

Aster plants were found to succumb to *Fusarium* wilt only when the disease was associated with a soil moisture deficiency. The selection of asters for resistance to the pathogen should, therefore, be attempted on fairly dry soils.

3082. Böhnert, E., and Mühlendyck, E.
Ein Asternwelke-Versuch. **(An aster wilt experiment.)**
Gartenwelt, 1955, **55**: 157-8.

A high proportion of asters of 15 varieties succumbed to wilt or showed stunted growth when planted on land on which asters had been grown the year before, while the controls on adjoining new land developed normally. Some of the varieties tested exhibited a high degree of resistance. It is suggested that selection for wilt resistance should be carried out on old aster soil.—Tech. Univ. Berlin.

3083. Maatsch, R., and Rünger, W.
Über den Einfluss der Saatzeit auf den Blütenertrag von Chabaudnelken. **(On the effect of time of sowing on flower yields in Chabaud carnations.)**
Gartenbauwiss., 1955, **1** (n.s.): 399-401, bibl. 1.

In two years' trials time of flowering and total flower yields were not appreciably affected by the date of sowing within the period 1 January to 1 March. Sowing on 14 or 16 March tended to delay flowering a little and to increase yields.—Tech. Hochschule, Hanover.

3084. Nelson, K. S., and Runnels, H. A.
The control of carnation wilt diseases.
Flor. Exch., 1955, **124** (6): 11, 45-6, illus.

Symptoms of rot and wilt diseases of carnations are described. Plants of Northland and Miller's Yellow grown in sand culture showed least bacterial wilt (*Pseudomonas caryophylli*) when receiving high amounts of K and Ca and low P. In soil cultures the spread of bacterial wilt among uninoculated plants was reduced by high K and Ca treatments; the greatest losses occurred in treatments where P and K were low. The maintenance of soil K at 20–40 p.p.m. and soil Ca at 200 p.p.m. is recommended. In initial tests in sand culture the antibiotic saponin gave some control of bacterial wilt. This substance occurs naturally in carnations, and there are indications that liberal supplies of K and Ca increase the amount present.—Ohio agric. exp. Stat.

3085. Bakker, M., and Scholten, G.
Een bacterie-verwelkingsziekte in Amerikaanse anjers. **(A bacterial wilt of carnations.)** [English summary ½ p.]
Tijdschr. PlZiekt., 1955, **61**: 7-10, bibl. 8, illus.

The bacterial wilt of carnations described is considered to be due to a strain of *Pseudomonas caryophylli.* Plants inoculated at the base of the stem showed disease symptoms after 1–3 months. Infection can only be controlled by the destruction of all plants in an infected greenhouse, followed by soil sterilization. *In vitro* experiments with antibiotics have shown that streptomycin has some inhibiting effect. Cuttings were taken from apparently healthy plants growing next to wilted plants and were placed in a solution of streptomycin or organic mercury before insertion in sand. The treatments killed some cuttings but the survivors remained free from bacteria for 1 to 2 months.—I.P.O., Wageningen.

3086. Scaramuzzi, G.
Control of carnation rust with fungicides in Italy.
FAO Plant Prot. Bull., 1954, **3**: 41-2.

An account is given of experiments on the control of carnation rust (*Uromyces caryophyllinus*). 0·3% zineb was the best fungicide used, giving only 10% infected leaves compared with 16, 23 and 62% after nabam, captan and bordeaux mixture, and its residue is invisible. Recommendations for the Italian Riviera are 3 nursery applications at 10– to 15–day intervals in February/April followed by 3-weekly field treatments from the end of July to the end of November.—Univ. Pavia.

3087. Denninger, C., and Dumont, L.
Les insecticides organiques de synthèse dans la lutte contre les cochenilles pseudococcines nuisibles aux cultures. **(Synthetic organic insecticides in the control of injurious mealybugs.)**
Commun. sci. IIIe Congr. int. Phytopharm., 1952, Vol. II, being *Phytiatrie-Phytopharm.*, Num. spéc., 1954, pp. 310-17, bibl. 7.

In greenhouse tests on a wide range of insecticides for the control of *Pseudococcus citri* on *Coleus* parathion gave the best results and Systox was also effective.—Stat. exp. Dargoire, Lyon.

3088. Butters, K. D.
Chrysanthemums from late-struck cuttings.
Agriculture, Lond., 1955, **62**: 19-23, illus.

The production of chrysanthemums from late-struck cuttings means a shorter growing season, easier management and better control of plant height, than does production from winter propagation. The production standard is based on number of flowers per square yard, which varies from 36 to 54, according to conditions. Propagation takes place between May and July. Cuttings may be obtained by the usual method of overwintering stools, or from stopped plants taken as cuttings earlier in the year. Plants may be transferred directly from the propagating frame to the house or grown outside before later housing. Continuous unchecked growth must be maintained, and satisfactory temperature control and watering are very important. Most midseason and late-flowering varieties have been grown with success from late-struck cuttings.

3089. de Groote, R.
Sur l'influence de quelques solutions nutritives dans l'aquiculture du chrysanthème. **(The effect of several nutrient solutions on chrysanthemums grown in water culture.)**
Bull. hort. Liége, 1955, **10**: 16-18, illus.

Of 5 standard nutrient solutions tested Hoagland's gave the best results with chrysanthemums. The dry matter content of flowers, leaves and stems of plants raised in this solution was very similar to that of plants grown in soil.—Stat. Rech. Amél. Plantes ornement., Ghent.

3090. Okada, M.
On the critical low temperature for flower bud differentiation in fall-blooming chrysanthemums. [Japanese, with English summary ⅓ p.]
J. hort. Ass. Japan, 1954, **23**: 187-92, bibl. 7.

The minimum temperature ranges which allowed flower bud differentiation were determined for 49 varieties of autumn-flowering chrysanthemum. Plants grown under artifically long days were transferred to natural short-day conditions at 10-day intervals from 15 September to 5 November. In some varieties flower buds failed to differentiate when the plants were transferred as early as 25 September, while in others they differentiated even when transferred at the latest date. In most varieties, however, flower buds failed to differentiate when the plants were transferred after 15–25 October, when minimum temperatures ranged from 14·6 to 11·4° C. It is concluded that this is the minimum temperature range for differentiation for most varieties. If all the varieties tested are included, however, the minimum temperature range was 16·5 to 7·6° C. There appeared to be no relationship between season of flowering and minimum temperature range for flower bud formation. Flower buds became more susceptible to cold injury as they grew larger.

3091. Okada, M., and Hiraki, Y.
Effect of re-illumination on the form of florets in chrysanthemum flowers retarded by artificial light. [Japanese, with English summary ¼ p.]
J. hort. Ass. Japan, 1954, **23**: 193-8, bibl. 8.

Winter-flowering chrysanthemums which have been retarded by artificial illumination generally bear somewhat deformed flowers with fewer ray florets than usual. In an attempt to increase the number of ray florets, plants which had been retarded by artificial illumination and then grown under short-day conditions to promote flower bud differentiation were re-illumined for various periods. Under favourable conditions the most successful treatment was re-illumination for 15 to 20 days after the plants had received about 6 days short-day treatment. Under more adverse conditions re-illumination had to be started a few days later. The treatment retarded flowering for a period equal to that of the re-illumination period.

3092. Iwai, S.
Responses of fall-flowering chrysanthemum varieties to photoperiod and temperature (2). [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1954, **23**: 199-204, bibl. 11.

From the results of experiments, made at altitudes of 360 m. and 850 m. with 16 chrysanthemum varieties, it was concluded that in 5 varieties flowering was influenced mainly by temperature while in the remaining 11 it was influenced mainly by day-length, flower buds differentiating when day-length was reduced to 14·5 hours and developing when it was reduced to 13·5 hours or less. Among the 11 varieties in which flowering was influenced mainly by day-length, 4 flowered earlier when the temperature was increased, while 7 were retarded by increased temperature. [For Part I see *H.A.*, 24: 2938.]

3093. Hollings, M.
Investigation of chrysanthemum viruses. I. Aspermy flower distortion.
Ann. appl. Biol., 1955, **43**: 86-102, bibl. 23, illus.

Tomato aspermy virus alone distorted some chrysanthemum flowers, and aggravated symptoms produced by other chrysanthemum viruses. First-season infection affected only a proportion of the blooms; in subsequent seasons nearly all flowers showed symptoms with increased severity. TAV had a wide host range, and was transmitted by 5 species of aphid infesting chrysanthemums. Infectivity was non-persistent in aphids. Negligible spread of TAV occurred by propagation methods, and the virus was not transmitted through seeds or soil. Suggested control measures include thorough rogueing of chrysanthemum stocks at flowering time, care in selecting new "sports", and control of aphids, especially early in the season. [From author's summary.]—Plant Path. Lab., Harpenden, Herts.

3094. Wageningen, Plantenziektenkundige Dienst.
Proeven ter bestrijding van meeldauw, *Erysiphe horridula* (Lév.) bij vergeetmij-nietjes, *Myosotis* spp. **(The control of mildew on forget-me-nots.)**
Jaarb. PlZiekt. Dienst, Wageningen 1953, 1954, pp. 115-17.

Mildew on forget-me-nots grown for seed was controlled by 0·04% sulphur applied at the end of April and 3 times thereafter. Spraying gave a markedly improved yield in bad disease years. There was some flower scorching in still, dry weather, and under these conditions spraying should be done in the evening.

3095. Munnecke, D. E., and Chandler, P. A.
Disease-free geranium stock.
Calif. Agric., 1955, **9** (5): 8, 14, illus.

In California the most important diseases of geraniums, *Pelargonium hortorum*, are bacterial stem rot and leaf spot, caused by *Xanthomonas pelargonii*, and the virus diseases mosaic and leaf curl. Control of the virus diseases depends on the production of disease-free propagating stock. Such material can be developed in 3 stages by establishing a mother-block, an increase-block and a production-block. The procedure to be followed and the precautions necessary are described.

3096. Thompson, H. S.
Hollyhock rust and its control.
Publ. Canada Dep. Agric. **920**, 1954, pp. 4, illus.

The symptoms and method of overwintering of rust (*Puccinia malvacearum*) on hollyhock are described. Curative control of the disease may be obtained with zineb at 2 lb. per 100 gal., applied 4 times at intervals of 7–10 days. The undersurfaces of the leaves should be thoroughly wetted. Sanitation is also important in controlling the disease.

3097. Cooper, C. C., and Watson, D. P.
Interaction of some environmental factors and the growth of *Salvia splendens*.
Quart. Bull. Mich. agric. Exp. Stat., 1954, **37**: 193-9, bibl. 8, illus.

With a view to producing *Salvia splendens* as a pot plant for the Christmas market an investigation was designed to study the interaction of root temperature, light intensity and photoperiod on the growth of plants in the greenhouse. Using plant height and fresh weight as a measure of growth, 70° F. root temperature produced more growth than 50° F. root temperature. Reduced light intensity resulted in greater plant height but less fresh weight accumulation than full light intensity. Flowers were produced under all photoperiodic treatments, but they were produced most quickly (in 98 days), and on relatively short laterals, when the plants were given 20 days of a 16-hour photoperiod followed by short days of 8 hours for the remainder of their growth. Increasing the number of short days reduced the height of the plants.

3098. Debuisson, J., and Klettenberg, R.
Quelques corrélations entre la duplicature et certains caractères phénotypiques chez *Matthiola incana* R. Br. *annua* Voss. **(Some correlations between double-flowering and certain phenotypic characters in ten-week stocks.)** [English summary 8 lines.]
Bull. Inst. agron. Gembloux, 1955, **23**: 13-48, bibl. 16.

Studies were made in 1951/54 on the relationship between double flowering and certain other characters in ten-week stocks. As a result growers are recommended to use only varieties showing the stable correlations pale leaves/double flowers and dark leaves/single flowers and to rogue plants with dark leaves on germination and again on pricking out and on planting out; or, in the absence of such varieties, to have recourse to older varieties and retain only strong plants.

Bulbs, tubers, etc.

(*See also* 2389, 2413, 2766, 3159i, k, s, w, 3160a, d, 3372, 3376, 3408o.)

3099. Anon.
Proeven met bloemen en bloembollen. **(Experiments with flowers and bulbs.)**
Jversl. Proefst. Groent. Fruit. Glas, Naaldwijk, 1954, pp. 30-2.

Gladiolus: attempts to delay flowering in Abu Hassan and Johan Strauss were unsuccessful, but better results were obtained with Allard Pierson. *Freesia:* length of warm storage (31° C.) of corms influenced flowering time, Caro Carlee and White Madonna flowering earliest after 15 weeks storage, and Buttercup and Oranjezon after 17 weeks; however, in all varieties earliest flowering resulted from 13 weeks' storage at 31° C. followed by 4 weeks at 13° C. By leaving corm lifting for 6 weeks after flowering the yield of corms was double that from earlier lifting. *Ornithogalum thyrsoides:* low storage temperatures gave poor and late growth; there was little difference between storage temperatures above 17° C.

3100. Kelsheimer, E. G.
Nematodes infesting certain bulbs, corms and tubers.
Proc. Fla St. hort. Soc. for 1954, pp. 297-300, illus.

A test with gladiolus was designed to show whether poor development of the abscission layer was associated with nematode infestation. Corms of Hopman's Glory from an infested field were used. Corms with little or no abscission layer development did not clean readily, grew slowly, produced flower spikes over a 2-month period and showed 96% nematode infestation. Corms which cleaned easily produced spikes over a 9-day period and showed 10% infestation. Nematodes on Crimson Wave caladium bulbs were successfully controlled by parathion and malathion dusts before storage.

3101. Hannibal, L. S.
Unusual seeding habits of *Amaryllis belladonna*.
J. roy. hort. Soc., 1955, **80**: 130-1.

Three types of seed were found after pollinating *Amaryllis belladonna* with *Crinum moorei*, namely large pulpy green seeds, medium-sized coral red seeds, and small coral red seeds. The coral red seeds were parthenogenetic, arising from spontaneous growth of the female germ cell. This phenomenon has also been observed in *Nerine*, *Brunsvigia*, *Habranthus* and *Zephyranthes*.

3102. Pam, A.
Germination of parthenogenetic seed in amaryllids.
J. roy. hort. Soc., 1955, **80**: 128-30, bibl. 2, illus.

Cut flowers of *Nerine bowdenii* were emasculated and pollen from other amaryllids was used as an irritant. The author concludes that the resultant viable seed was parthenogenetic.

3103. Kamemoto, H., and Nakasone, H. Y.
Improving anthuriums through breeding.
Hawaii Fm Sci., 1955, 3 (3): 4-5, illus.

A few controlled hybridizations with anthuriums have indicated that neither white nor red flower colour is dominant, and pink is an intermediate heterozygous condition. Among other characters considered in selection are high productivity, flower shape and texture, short internodes and suckering ability.

3104. Maatsch, R., and Rünger, W.
Keimung von Cyclamen in verschiedenen Substraten. **(The germination of cyclamen in different media.)**
Gartenwelt, 1955, **55**: 93-4, bibl. 2.

Several leaf mould, compost, peat and sand mixtures gave excellent germination of cyclamen seed, provided the particle size was not too small. Fruhstorfer's standard potting soil [*H.A.*, 24: 620] produced the best seedling growth. Temperature (15–20° C.), however, proved more important than medium.—Tech. Hochschule, Hanover.

3105. Maatsch, R., and Rünger, W.
Über die photoperiodische Reaktion einiger Sorten von *Dahlia variabilis* Desf. **(On the photoperiodic reaction of varieties of *Dahlia variabilis*.)**
Gartenbauwiss., 1955, **1** (n.s.): 366-90, bibl. 7, illus.

In experiments with several dahlia varieties the border line between short- and long-day treatments was found to be at a day-length of 12–13 hours. With 10- to 12-hour days lateral shoots were formed only in the upper leaf axils, whereas all leaf axils produced shoots under long-day conditions. Short-day plants began to die off soon after they had reached a certain size and had formed a few flowers, but long-day plants (14 hours) showed no such response, though their behaviour in a 13-hour day requires further study. Tuber growth increased with increasing day-length up to 12 hours but was inhibited (in cuttings) under long-day conditions. Flowering occurred under both short- and long-day conditions, though some flower buds failed to develop in short days. A 10- to 12-hour treatment promoted earliness, while the number of inflorescences increased with day-length in relation to the greater number of lateral shoots formed. Flowering was suppressed by 6- to 10-hour photoperiods. There was a preponderance of tubular and ligulate flowers under short- and long-day conditions respectively. A short-day treatment lasting 20–30 days was sufficient to promote tuber formation if started at the beginning of August.—Tech. Hochschule, Hanover.

3106. Holmes, F. O.
Elimination of spotted wilt from dahlias by propagation of tip cuttings.
Phytopathology, 1955, **45**: 224-6, bibl. 15, illus.

A clone of the dahlia variety Rhythm, all plants of which were severely affected by spotted-wilt disease, was transformed into a healthy stock of plants by the rooting of small stem-tip cuttings. Several other dahlia varieties were similarly freed from this disease. Apparently the causative virus does not move freely toward the growing tips of dahlia plants but lags behind the growth of the stem. Recovered stocks remained free of disease when grown in the absence of a source of reinfection. [Author's summary.]—Rockefeller Inst. med. Res., N.Y.

3107. Kosugi, K., and Ōtani, M.
Studies on flower bud differentiation and development in freesia. II. Effects of low temperature on flower bud differentiation and flowering in freesia. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1954, **23**: 165-71, bibl. 31.

To determine the effect of low temperature treatment of the corms on flower bud differentiation and flowering, corms of *F. refracta* var. *alba* were given (*a*) no treatment and (*b*) various low temperature treatments in moist and dry cold storage, before being planted at monthly intervals from August to December. In the untreated group flower bud formation occurred from 24 October to 23 December when the plants were 3·1 to 22·8 cm. high, according to time of planting. Flowering began from 23 January to 16 March according to time of planting. The later the corms were planted the lower was the percentage of flowering, the number of flowers per plant, the height of the plants and the number of leaves, and the greater was the percentage of malformed flowers and the length of the harvest period. In the low temperature treated group flower bud initiation occurred from 14 September to 3 November when the plants were 13·1 to 23·6 cm. high, and flowering began from 1 December to 6 February, according to treatment. Flower bud initiation and flowering were earliest in corms that had been given 40 or 50 days moist storage at 10° C. These treatments, however, reduced the percentage of flowering, number of flowers per plant, height of plants and number of leaves, and prolonged the harvest period, compared with the other low temperature treatments, which were (*a*) 30 days dry storage at 3° C., (*b*) 30 days dry storage at 15° C., (*c*) 20 days moist storage at 10° C., and (*d*) 20 days moist storage at 10° C. followed by 20 days at 3° C. These 4 treatments did not hasten the time of flowering compared with the controls.

3108. van der Nes, A. G. A.
Virusbestrijding bij *Freesia*. **(Virus control in freesias.)**
Jversl. Proefst. Groent. Fruit. Glas, Naaldwijk, 1954, pp. 59-62, illus.

The symptoms and transmission of *Freesia* virus and *Phaseolus* virus 2 are described. Control measures are the destruction of infected plants, particularly before harvesting, and control of aphids by parathion or Systox.

3109. Woltz, S. S.
Studies on the nutritional requirements of gladiolus.
Proc. Fla St. hort. Soc. for 1954, pp. 330-4, bibl. 3.

Sand culture experiments were used to investigate the nutritional requirements of gladiolus, using commercial-sized corms of Elizabeth the Queen and Picardy. Omission of N was a factor in causing blindness and also reduced the number of florets per spike. In order of decreasing effect, Mg, K, P and Ca deficiencies lowered the average floret count and K, Mg, N and Ca deficiencies resulted in shorter spikes. K and Mg deficiencies appeared to delay flowering. The weight of spikes was reduced by omissions of N, Ca, P and Mg in that order, while leaf production was most affected by N, K and P deficiencies. The plants were most susceptible to B toxicity, followed by those of Cu, Zn and Mn. Sodium chloride at 0·06 molar concentration resulted in smaller, darker green plants than the controls. Fe deficiency was more easily corrected by Fe-EDTA at 0·25 p.p.m. than by ferrous sulphate or ferric citrate; greening was apparent 4 days after treatment. At 3–10 p.p.m. Fe-EDTA produced brown blotches on the leaves.

3110. Blickensderfer, C. B.
Sod-based rotations for bulb and flower crop land.
Proc. Fla St. hort. Soc. for 1954, pp. 327-30, bibl. 2.

Following the failure of a gladiolus crop due to fusarium and nematodes the soil was sown to Pensacola Bahia grass. A complete fertilizer was given during the 2 years in grass, and then gladioli were planted again. The flowers harvested were of good average quality, and the corms lifted were much better than those planted.—U.S. Soil Conserv. Serv., Sarasota.

3111. WAGENINGEN, PLANTENZIEKTENKUNDIGE DIENST.
Proeven ter bestrijding van *Fusarium* in gladiolenknollen, *Gladiolus* spp. **(Experiments to control *Fusarium* in gladiolus corms.)**
Jaarb. PlZiekt. Dienst Wageningen 1953, 1954, pp. 111-12.

Gladiolus corms, variety Tivoli, were dipped in several concentrations of Aretan for various lengths of time just before planting. All treatments reduced *Fusarium* infection as compared with untreated corms. The highest yields were given by corms treated with ⅛% Aretan for 48 hours.

3112. FORSBERG, J. L.
The use of insecticides as corm and soil treatments for control of bacterial scab of gladiolus.
Plant Dis. Reptr, 1955, **39**: 106-14, bibl. 3, illus.

The insecticides aldrin, lindane and heptachlor applied to the soil at planting time effectively controlled bacterial scab of gladiolus. In soil which produced heavily scabbed corms when no treatment was used the insecticides reduced scab about 90%. Application of the insecticides to the soil was more effective than was use of the same insecticides as corm treatments. The insecticides mixed with Arasan and applied to the corms dry were more effective than the same insecticides used in the emulsion form as wet treatments, either alone or combined with the fungicide Emmi [N-ethylmercuri-1,2,3,6-tetrahydro-3,6-endomethane-3,4,5,6,7,7-hexachlorophthalimide]. Use of mixtures of Emmi and lindane and of Emmi and aldrin as corm treatments resulted in some injury. No injury resulted from use of mixtures of Emmi and heptachlor or from mixtures of Arasan and the insecticides. [Author's abstract.]—Ill. St. nat. Hist. Survey, Urbana.

3113. MAGIE, R. O.
Stromatinia disease of gladiolus.
Proc. Fla St. hort. Soc. for 1954, pp. 313-17, bibl. 10.

Symptoms are described of dry rot (*Stromatinia gladioli*) as occurring on corms, roots and neck tissue of gladiolus. Some reduction in losses may be obtained by (1) rotation, so that gladiolus is grown only once in 3 or 4 years; (2) planting infested corms or infested fields very early or very late in the season; (3) restricting irrigation as much as possible; and (4) post-lifting and/or pre-planting treatments with Dowicide B and Ceresan. Satisfactory control of neck rot was obtained on a fine-sand soil by incorporating 1,500 lb. calcium cyanamide per acre 60 days before planting.

3114. LENZ, L. W.
The endosperm as a barrier to intersectional hybridization in *Iris*.
El Aliso, 1954, **3** (1): 57-8, bibl. 5, illus.

Seeds resulting from crosses between the tall bearded iris (♀) and the crested iris, *I. tectorum* (♂), failed to grow. An examination of half-mature capsules showed that the seeds contained embryos, but only a thin, colourless liquid or no substance in place of endosperm. Embryos excised from seeds in 60-day-old capsules were successfully germinated on nutrient agar. Further work on the culture of very young embryos is in progress.

3115. GOULD, C. J.
Control of *Sclerotium rolfsii* Sacc. in iris bulbs.
Phytopathology, 1954, **44**: 711-13, bibl. 12.

Soaking infected bulbs for 3 hours in a warm (110° F.) solution of formalin (0·5%) has given practical control in both experimental and commercial tests. [From author's summary.]—W. Wash. Exp. Stat., Puyallup.

3116. ANON.
Considering the lilies.
Agric. Res. Wash., 1955, **3** (9): 14, illus.

Crossing the newer tetraploid Easter lilies proved difficult, but when 0·1 to 1% naphthaleneacetamide was applied to petal-tear wounds seed was obtained and promising seedlings were produced.

3117. BALD, J. G., KOFRANEK, A. M., AND LUNT, O. R.
Leaf-scorch and *Rhizoctonia* on Croft lilies.
Phytopathology, 1955, **45**: 156-62, bibl. 10, illus.

In an experiment on the influence of nutrition on leaf scorch of Croft lilies, root injury associated with *Rhizoctonia solani* was assessed and compared with the incidence of leaf scorch at various nutrient levels. N and Ca levels and, to a lesser degree, soil pH influenced both leaf scorch and root rot, but the effects on leaf scorch were complicated by a group of factors including conditions under which the bulbs were stored before planting. A significant association between the severity of leaf scorch and damage to the roots was revealed by the calculation of partial correlations. In the high (excessive) N series blasting of buds was also associated directly with root damage. Leaf scorch and bud blast apparently were influenced in opposite ways by excessive soil N, which decreased leaf scorch and increased bud blast. Symptoms associated with *Rhizoctonia* were root rot, reduced growth, and reduced bud count. Control of root rot by Lysol-ferbam dip also reduced leaf scorch. Other circumstantial evidence of association between leaf scorch and root damage was found. It was postulated that leaf scorch is associated with root damage caused by *Rhizoctonia* or by some other incitant. Hence the control of leaf scorch by proper fertilizing would be a suppression of symptoms rather than control of the basic cause of leaf scorch. [From authors' summary.]—Univ. Calif., Los Angeles.

3118. JENSEN, H. J., CAVENESS, F. E., AND MCWHORTER, F. P.
Root lesion nematodes cause heavy lily damage.
Flor. Exch., 1955, **124** (15): 10.

Complaints have been received by lily growers that certain bulbs failed to respond to forcing because of nematode infestation. Tests at the Oregon Experiment Station, however, have shown that the presence of root lesion nematodes in the old roots of lilies did not retard growth and flowering. To prevent dissemination chemical, thermal and vacuum disinfection methods have been tried but so far none is considered safe. The removal of some of the old roots after cold storage reduced infestation without affecting the forcing quality of the bulbs. [See also *H.A.*, 25: 1931.]

3119. Müller, H. W. K.
Zum Auftreten und zur Bekämpfung des Wurzelspinners *Hepialus lupulinus* L. in Maiblumenkulturen. **(Incidence and control of the swift moth in lily-of-the-valley plantings.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1955, **7**: 34-7, bibl. 14, illus.

Growers of lily-of-the-valley in different parts of Germany have been suffering severe, often total, losses from attacks of the swift moth, *Hepialus lupulinus*, the larvae of which feed on the roots and crowns of the plants. Of the chemicals tested under various weather conditions the best results were obtained with a double-strength DDT suspension applied in the second half of July at the rate of 2·5 litres per sq. m. This treatment reduced the number of larvae per sq. m. from 100–200 to less than 20. There are prospects for biological control of the pest, but further studies are needed.—Staatsinst. angew. Bot., Hamburg.

3120. Wageningen, Plantenziektenkundige Dienst.
Proeven ter bestrijding van de galmijt, *Aceria* (*Eriophyes*) *tulipae* Keifer in tulpenbollen, *Tulipa* spp. **(Experiments on the control of gall mite in tulip bulbs.)**
Jaarb. PlZiekt. Dienst, Wageningen 1953, 1954, pp. 114-15.

Tulip gall mite control tests involved bulb fumigation with HCN and methyl bromide used at different concentrations and times. Two fumigations, 12 days apart, gave complete mite kill even at low concentrations. Kills were not always complete after only one treatment. In further tests with HCN fumigation at 1–10 g./m.^{3} for 4 hours no living mites were found 4 days after treatment. Methyl bromide fumigation had no apparent effect on subsequent flowering.

Lawns.

(*See also* 2379, 3160g.)

3121. Turley, R. H.
Lawns. Planting and maintenance.
Mimeo. Saanichton exp. Stat. **153,** 1954 (issued 1955), pp. 9, illus.

Advice is given on the construction and sowing of new lawns and on the following aspects of maintenance: fertilizer mixtures, mowing, and the control of weeds, mosses, diseases, fairy rings and pests. Fourteen varieties of grass and 9 mixtures are being tested at Saanichton. Brief notes are supplied on 4 varieties of fescue, 3 of blue grass and 5 of bent grass.

3122. Anon.
Aids to turf management.
Gdnrs' Chron., 1955, **137**: 116, illus.

Details are given of some new machines and attachments available to the private gardener for lawn mowing, edging, aerating, raking, etc., and for applying liquid fertilizer by overhead spray.

3123. Escritt, J. R.
Electrical soil warming as an anti-frost measure for sports turf—a further report.
J. Sports Turf Res. Inst., 1954, **8**: 354-64, illus.

As the result of a total of six winters' observations it has been clearly shown that, under exposed conditions, playing areas can be kept unfrozen by means of electrical soil warming. This is effected by warming wires spaced 6 to 9 in. apart in the soil at a depth of about 6 in. A successful scheme may be based on infrequent warming as required with a loading of 10 watts per sq. ft or regular warming for 12 hours every night throughout the danger months at a rather lower loading. At Bingley 4 watts per sq. ft has proved sufficient where a turf cover is maintained but insufficient on areas lacking turf cover, and 6 watts per sq. ft is suggested as a minimum where the continuous warming type of scheme is preferred. It is suggested that, whereas regular warming at this rate is convenient and possibly cheaper per unit of electricity, the higher loading, used as required, may prove more satisfactory and use less electricity. Consideration is given to possible costs of a practical installation using relatively cheap protected warming wires at mains voltage. [From author's summary.]

3124. Davidson, J. H.
Turf renovation using Dowfume MC-2 with no cultivation.
Down to Earth, 1955, **10** (4): 8-9, bibl. 4, illus.

An area of weed infested turf was fumigated with methyl bromide at 1 lb. per 100 sq. ft under a gas-proof cover on 2 September, the exposure time being 2 days. The fumigation killed all vegetation and was followed immediately by fertilizer application and sprinkler irrigation. Merion bluegrass seed was sown on the undisturbed dead sod on 9 September and the area was again sprinkled. An excellent turf developed by 1 November. Means and methods of placing and sealing the gas-proof cover are described in detail.—Dow chem. Co.

3125. Smith, J. D.
Fungi and turf diseases. 4. Corticium disease.
J. Sports Turf Res. Inst., 1954, **8**: 365-77, bibl. 11, illus.

Corticium disease (*Corticium fuciforme*) is discussed under the following headings: symptoms, infection, spread, susceptibility of different grasses, association with manurial treatments, and control by manuring and fungicides. [See also *H.A.*, 24: 2975.]

3126. Shurtleff, M. C.
Chemotherapy of turf brown patch.
From abstr. in *Phytopathology*, 1955, **45**: 186.

Solutions of 38 compounds were applied to the soil of pots containing a mixture of 4 grasses prior to inoculation with *Rhizoctonia solani*. Dichlone and 8-hydroxyquinoline gave the best results (over 95% control) followed by thiram and endomycin (90–95%). Thiram and cupric maleic hydrazide gave 50% control when inoculation was deferred until 20 days after treatment.

3127. Smith, J. D.
Fusarium patch disease—fungicide trials, 1954.
J. Sports Turf Res. Inst., 1954, **8**: 445-7, bibl. 1.

Experiments on the control of fusarium patch disease

(*Fusarium nivale*) were continued at Bingley [see also *H.A.*, 24: 2976]. The following fungicides gave satisfactory results: Experimental Fungicides Nos. 5 and 12, Bordeaux malachite XTRA, Malachite green/bordeaux mixture, Merfusan and Antimucin MG.

3128. Meiners, J. P.
Etiology and control of snow mold of turf in the Pacific Northwest.
Phytopathology, 1955, **45**: 59-62, bibl. 20, illus.

Snow mould of turf in the Pacific Northwest is associated with either or both of 2 organisms, *Fusarium nivale* and *Typhula itoana*. Epidemiology depends upon certain weather conditions and varies with the particular organism involved. The latter species incites disease development only when the turf is snow covered. In contrast, the disease associated with the former species develops not only under snow cover but also in the absence of snow during cool, moist periods in fall and spring. Damage to susceptible turf areas may be severe, and control measures must be provided to maintain healthy turf. In tests over 3 years phenyl mercury formulations consistently gave the best control. [From author's summary.]—Wash. agric. Exp. Stats, Pullman.

3129. Shurtleff, M. C.
Preinoculation and postinoculation application of fungicides for stem rust of Merion bluegrass.
From abstr. in *Phytopathology*, 1955, **45**: 186.

Thirty fungicides were sprayed on Merion bluegrass seedlings growing in pots 48 hours before, or 48 hours after, their inoculation with *Puccinia graminis*. Dichlone, maneb, zineb, Acti-dione-Errated (cyclo-heximide and ferrous sulphate), and EMTS Turf Fungicide (*N*-(ethylmercuri-*p*-toluenesulphonanilide)) gave 97–100% control (reduction of uredia compared to the checks) as preinoculation sprays. Acti-dione-F, maneb, and EMTS gave 79, 71 and 67% control, respectively, as postinoculation sprays. Dichlone, although 91% effective 32 hours after inoculation, was only 21% effective 48 hours after inoculation. Three proprietary compounds gave 97–100% control for both treatments and one was still 67% effective when applied 120 hours after inoculation.

3130. Smith, J. D.
Dollar spot disease—fungicide trials, 1954.
J. Sports Turf Res. Inst., 1954, **8**: 439-44, illus.

Four British and 4 American fungicides were compared for the control of dollar spot disease (*Sclerotinia homoeocarpa*) on *Festuca rubra* at St. Ives Research Station, Bingley, Yorks., in 1954. The rate of application was 250 ml. per 25 sq. ft. In preventive/curative trials Verdasan, Merfusan, Experimental Fungicide 12, Antimucin MG, Krominate, Puraturf 177 and Calocure were effective. In preventive trials the best British fungicide was Antimucin MG; at 28·75 g. per 250 ml. water it reduced infection from 28·8 to 5·0% and caused practically no scorching. Experimental Fungicide 12 and Merfusan also gave satisfactory results with little scorching. Of the American fungicides Calocure at 2·0 g. per 250 ml. water was the best, reducing infection from 32·5 to 8·8%, and Krominate the next best.

Orchids.

3131. Richardson, D.
Odontoglossums in an air-conditioned greenhouse.
Gdn J. N.Y. bot Gdn, 1955, **5**: 54-7, illus.

The construction of an air-conditioned orchid house erected in New Jersey is described. The following conclusions were reached from growing odontoglossums under controlled conditions of light, temperature and humidity. A constant light intensity of only 660 f.c. at plant level for 16 hours a day results in as satisfactory growth as a stronger but variable light intensity with a maximum of 2,700 f.c. and natural day-length. A relative humidity of 75% with a day temperature of 66° F. produces better growth than temperatures of 60° F. day and 50° F. night. Constant day and night temperatures during summer and winter appear to favour growth. For seedlings in the community pot stage the best compost tested was German peat moss with a little sharp sand. It is suggested that the most satisfactory method of asexual propagation is to sever the bulb while in the pot and leave it with the parent plant until new growth occurs.

Succulents.

3132. K., E. E.
A pendulous bryophyllum.
Gdnrs' Chron., 1955, **137**: 167, illus.

Bryophyllum uniflorum, when grown in a moist tropical house, will increase rapidly but flowers very poorly, if at all. Grown in good light in a cool greenhouse the inflorescences bear 2, 3 or even 5 flowers. At the Royal Botanic Garden, Edinburgh, it has responded very well to culture in baskets lined with sphagnum moss and filled with J.I.P.2 compost. The plants were raised from cuttings 2 in. long inserted through the moss.

3133. Vickery, H. B.
The effect of abnormally prolonged alternating periods of light and darkness upon the composition of *Bryophyllum calycinum* leaves.
Plant Physiol., 1954, **29**: 520-6, bibl. 14.

The changes in the organic acid and starch contents of detached *Bryophyllum* leaves were studied under continuous artificial illumination for 24 hours followed by 24 hours darkness. At room temperature the time required for major changes in these components to occur was rather closely related to the period of the normal diurnal variation in light and darkness.—Conn. agric. Exp. Stat., New Haven.

3134. Maatsch, R., and Rünger, W.
Über die Blütenbildung von Zygocactus.
(Flower formation in *Zygocactus*.)
Gartenwelt, 1955, **55**: 153-4, bibl. 1.

Short-day treatment of 8–11 hours, during which night temperatures did not exceed 20° C., was found to induce flower formation in *Zygocactus truncatus* (*Epiphyllum truncatum*). Flowers opened about 2½–3 months after the beginning of the treatment which was continued until a fair number of buds became visible. Temperatures above 23–24° C. and below 10° C. or a 14-hour day delayed flowering. The studies were carried out on plants which normally flower towards the end of December; work on earlier flowering varieties and on other aspects of *Zygocactus* culture continues.—Tech. Hochschule, Hanover.

Roses.

(*See also* 3045, 3046, 3159q, 3160n.)

3135. National Rose Society of Great Britain.
The rose annual 1955.
National Rose Society, London, [1955], 8×5½ in., pp. 162, illus., 8s. 6d.

This year's annual contains two interesting articles on rose breeding, one on the possible modes of inheritance of fragrance, the other on the possibility, still unrealized, of using the intergeneric hybrid *Hulthemosa* to produce eye-spotted roses. There are also notes on the effects of the 1953-54 frosts on roses in various parts of England, on the use of Fe and Mn chelates to correct chlorosis in plants growing on chalky soil, on experiments at Oaklands showing the value of light pruning, on old-fashioned roses and on new introductions.

3136. Park, B. (Editor).
Roses. A select list and guide to pruning.
National Rose Society, London, 1954, 7×5 in., pp. 120, illus., 5s.

This list includes descriptions of many new varieties, nearly all of which have been approved by the Rose Society after 2 years' trials at St. Albans. The classification used is based on appearance rather than parentage, and the varieties are divided into hybrid tea, floribunda bedding and shrub, ramblers and climbers, polyantha pompons, shrub species and their hybrids, and miniature china roses. Pruning methods for each type are described and illustrated. Finally a short selection is given of roses suitable for growing in pots under glass, for bedding, for standards and for hedges.

3137. Park, B.
Roses. Hints on planting and general cultivation.
National Rose Society, London, undated, 7×5 in., pp. 24, illus., 2s.

This well-illustrated booklet forms a useful guide for beginners, giving advice on soil preparation, planting, annual cultivations, fertilizers, pests, diseases and propagation.

3138. Asen, S.
The effect of various planting distances on the productivity and quality of flowers produced by the Happiness variety of greenhouse rose.
Quart. Bull. Mich. agric. Exp. Stat., 1954, 37: 122-4.

An increase of 30% in the number of plants per unit of bench area (a spacing of 9×12 in. instead of the usual 12×12 in.) increased the number of flowers produced per unit area by approximately 10% without any apparent reduction in their quality.

Other trees and shrubs.

(*See also* 3159 l, r, t, z, 3160f, h, m, o, 3399.)

3139. Koobation, M.
Practical treatments to increase seed germination of woody ornamental shrubs in California.
[*Mimeo. Publ.*] *Dep. orn. Hort., Calif. St. Polytech. Coll.*, 1954, pp. 18, $0.75 U.S., $1.00 foreign.

The following methods of seed treatment are described: sulphuric acid scarification, mechanical scarification, hot water treatment, soaking seeds in cold water, cold stratification and warm temperature stratification. Brief recommendations are given for treating the seeds of many ornamental species, including one or more species of the following genera: *Amelanchier*, *Amorpha*, *Arbutus*, *Arctostaphylos*, *Aronia*, *Berberis*, *Betula*, *Buxus*, *Cassia*, *Ceanothus*, *Chaenomeles*, *Cornus*, *Corylus*, *Cotoneaster*, *Cupressus*, *Cytisus*, *Elaeagnus*, *Erythrina*, *Euonymus*, *Fremontia*, *Garrya*, *Hamamelis*, *Ilex*, *Juniperus*, *Laburnum*, *Ligustrum*, *Lonicera*, *Mahonia*, *Malus*, *Musa*, *Prunus*, *Rhamnus*, *Rhus*, *Ribes*, *Robinia*, *Rosa*, *Rubus*, *Sorbus*, *Strelitzia*, *Symphoricarpos*, *Syringa*, *Taxus* and *Viburnum*.

3140. de Boer, S.
Het stekken van boomkwekerij gewassen.
(The propagation of shrubs and trees by cuttings.)
Proefstation voor de Boomkwekerij, Boskoop, 1955, pp. 123, illus.

In this booklet are summarized the data obtained from experiments at Boskoop during 13 years' research on propagating trees and shrubs from cuttings. It is arranged so that growers can get practical advice quickly. Methods and materials are described in a general introduction, which is followed by summarized descriptions of the experiments arranged by species in alphabetical order. Finally, recommended procedures are tabulated for many species and varieties with respect to time at which to take cuttings, rooting medium, whether to wound or not, and type and concentration of growth substance to use. This booklet should be of great value to all plant propagators working under conditions at all similar to those at Boskoop.

3141. Pirone, P. P.
Air layering as a method of plant propagation for arborists.
Proc. nat. Shade Tree Conf. 1954, pp. 113-22, bibl. 4, illus.

Methods of marcotting using moist sphagnum moss enclosed in Krene plastic film are described. In the New York Botanical Garden it has proved more difficult to marcot woody plants out of doors than in greenhouses. One trouble is that the sphagnum ball is apt to become waterlogged during periods of heavy rain, but this can be avoided by using Scotch tape to seal the upper end of the plastic wrap. Species that have been successfully rooted out of doors include abelia, arbor-vitae, azalea, berberis, callicarpa, camellia, cotoneaster, deutzia, forsythia, gardenia, holly, Itea lilac, mahonia, mulberry, philadelphus, pieris, *Platanus acerifolia*, rhododendron, rose, Russian olive, tamarix, viburnum and yew.

3142. Rai, G. S., and Hamner, C. L.
Inhibiting the growth of plants with maleic hydrazide.
Quart. Bull. Mich. agric. Exp. Stat., 1955, **37**: 375-86, bibl. 23, illus.

Growth inhibition experiments were conducted with maleic hydrazide on various shade tree species, including elm (*Ulmus americana*), sugar maple (*Acer saccharum*), jack pine (*Pinus banksiana*), Scotch pine (*Pinus sylvestris*) and black locust (*Robinia pseud-acacia*). Foliar applications of various MH concentrations, i.e. 2,000, 4,000, 8,000 and 12,000 p.p.m., were made at different times of the year. All the treatments retarded the growth of the plants to a certain extent. In some cases high concentrations caused some chlorosis, but the following year the leaves were normal. High concentrations caused greater growth inhibition, which persisted over a longer period, than lower concentrations. In field experiments with 1-year-old elm seedlings, the addition of vinyl latex 600 at various concentrations to the MH solution at 2,000 p.p.m. did not result in greater growth inhibition than the MH solution used alone. In greenhouse tests with sugar maple, however, the addition of 10% vinyl latex delayed emergence of leaves longer than the 2,000 p.p.m. MH solution used alone.

3143. Bremer, H.
Der Laubfall der Bäume in seinen Beziehungen zu Standort und Konstitution. (Kurze Mitteilung.) (**Leaf fall of trees in relation to locality and tree condition. Short communication.**)
Gartenbauwiss., 1955, **1** (n.s.): 402-9, bibl. 7, illus.

The following observations were made over a period of years on the autumn leaf fall of ornamental trees and apricots in various localities: (1) Water deficiency causes early leaf fall. (2) The older leaves in the interior of the tree usually drop first and abscission spreads gradually to the periphery. (3) External factors injurious to the foliage may alter the sequence of leaf fall. (4) Some species are very constant in their sequence of leaf fall, while others are apt to vary with locality and weather conditions. (5) Constitutional disturbances cause changes in the sequence of leaf fall which may be of diagnostic value.

3144. Rial Alberti, F.
Las especies del género *Acer* cultivadas en la Argentina. (**The species of *Acer* cultivated in Argentina.**)
Rev. Invest. agríc. B. Aires, 1951, **5**: 483-522, bibl. 27, illus. [received 1955].

Botanical descriptions are given of 13 species and a number of varieties of *Acer*, together with brief notes on their performance in Argentina.

3145. Peeters, F.
Application de la lumière artificielle dans la culture de l'*Azaléa indica.* (**Application of artificial light to the culture of *Azalea indica.***) [English and German summaries 2 and 3 lines.]
Rev. Agric. Brux., 1955, **8**: 470-5.

Unrooted cuttings of *Azalea concinna* on which scions of *A. indica* var. Findeisen had been grafted and unrooted cuttings of *A. indica* var. Robert Van Oost were planted in peat in mid-April, 1954. From 6 May, by which time they had callused, they were artificially lighted for 14 hours daily at intensities ranging from 120 to 790 f.-c. by lamps placed 20–60 cm. above the lights covering them. The results and conclusions were: (1) plants receiving 680–790 f.-c. (20 cm. lamp distance) rooted better than the controls, which received only natural light during May and June. (2) Rooting was much the same at all lamp distances and 50 and 60 cm. are therefore recommended. The effects of overhead and side light, and the density of rooting in artificial and natural light are discussed.

3146. Raabe, R. D., and Sciaroni, R. H.
Petal blight disease of azaleas.
Calif. Agric., 1955, **9** (5): 7, 14, illus.

The symptoms, dissemination and control are discussed of the disease known as petal blight or ovulinia flower blight, which is causing increasing concern among azalea growers in California. Out of doors the disease can be held in check by spraying 3 times a week with Parzate or Dithane Z-78 at 12 oz./100 gal. plus 1–2 oz. spreader-sticker, supplemented by picking and destroying infected flowers, ground-spraying with Fermate at 6 lb. per 1,000 sq. ft, applying new mulches and avoiding overhead watering. Under glass the best control is to reduce the humidity to 85% or lower. Plants should be introduced to new areas bare-root and before flower buds show any colour.

3147. Herold, H.
Der Blatt- und Knospenfall bei Kamellien. (**Leaf and bud drop in camellia.**)
Gartenwelt, 1955, **55**: 162.

The tendency of glasshouse camellias to drop their leaves and buds in winter is explained by the depletion of reserve materials through respiration at a time when photosynthetic activity is low. The author found that lowering the temperature to 4–6° C. to depress respiration followed by the application of readily available nutrients with rising temperatures later on largely prevented the trouble.

3148. Lenz, L. W.
A new garden hybrid in *Ceanothus.*
El Aliso, 1954, **3** (1): 51-3, illus.

A description is given of a hybrid, with several desirable horticultural characteristics, which resulted from a cross between the deciduous *C. americanus* and the evergreen *C. cyaneus*. It has proved easy to propagate from cuttings, grows 5 to 6 ft tall, is deciduous or nearly so, and produces gentian blue flowers on the current season's wood, mainly between June and August.

3149. Bridgers, B. P.
Flowering dogwoods from stem cuttings.
Amer. Nurserym., 1955, **101** (8): 14, 84-5, bibl. 9, illus.

Preliminary work with white-flowering dogwood (*Cornus florida*) has shown that wounding cuttings taken in early June from the current season's growth followed by treatment with 20 mg. of indolebutyric acid in 1 g. of talc resulted in 100% rooting. Unwounded cuttings and treatment with lower rates of IBA or a mixture of IBA+IAA+NAA gave less satisfactory rooting responses.

3150. Satoo, T., and Hukuhara, N.
Water relations of cuttings shortly after planting.
Bull. Tokyo Univ. For., 1953, **45**: 89-101, from abstr. in *Rec. Res. Fac. Agric. Univ. Tokyo, No. IV (1953-1954)*, 1955, p. 71, No. 145.

The transpiration rate of leaves on newly planted stem cuttings of *Cryptomeria japonica* and *Euonymus japonicus* was much higher than that of leaves on seedlings and rooted cuttings but fell gradually and after a week became constant at a rate lower than that of the plants with roots. In *E. japonicus* it was at first very high in the morning and much lower in the afternoon, but after a week it became similar to, but significantly lower than, that in rooted cuttings, which show the normal type of diurnal variation. The diurnal variation in stomatal aperture in *E. japonicus* was similar to that of transpiration.

3151. Broertjes, C.
Het forceren van *Forsythia intermedia spectabilis* Khne. **(Forcing *Forsythia intermedia spectabilis*.)** [English summary 7 lines.]
Meded. Dir. Tuinb., 1955, **18**: 111-18, bibl. 12, illus.

Cut *Forsythia* branches flowered satisfactorily after storage at −2° C. for 4–5 weeks before forcing. The inclusion of apples in the cold store resulted in irregular and slow flowering of the *Forsythia* during subsequent forcing. Defoliation of growing shrubs in the autumn was obtained by using disodium 3,6-hexahydrophthalate; branches were defoliated by dipping them in water, before putting them in a warm greenhouse and covering with reed mats.—Proefstat. Boomkw. Boskoop.

3152. Uschdraweit, H. A.
Eine Viruskrankheit bei der Gattung *Fuchsia*. **(A virus disease of the *Fuchsia* genus.)**
Gartenwelt, 1955, **55**: 147-8, illus.

Plants of *Fuchsia corymbiflora* and *F. boliviana* showed weakened and irregular growth and poor flower formation. The symptoms were attributed to a virus disease which appeared to be limited to these species. Graft and sap transmissions to other *Fuchsia* spp., and to *Nicotiana* and *Datura* spp. were unsuccessful. Infected plants should not be used as a source of cuttings.—Inst. gärtn. Virusforsch., Berlin-Dahlem.

3153. Philipp, W.
Milben an Efeu. **(Mites on ivy.)**
Gartenwelt, 1955, **55**: 148-9, illus.

Eight days after immersing mite-infested shoots in a 0·035% solution of E605, the shoots had recovered and showed normal growth. A Systox spray was also used successfully under glass and the plants remained clean for longer than when E605 was applied as a spray. The build-up of strains of mite resistant to E605 or Systox can be prevented by periodical applications of sulphur.

3154. Moens, R.
Een geval van bladrolleraantasting op seringen, *Adoxophyes orana* (Fisch. v. Roesl.) (*Capua reticulana* Hb.). **(A case of leaf-roller attack on lilac.)**
Parasitica, 1955, **11**: 16-20, bibl. 3, illus.

The life history of *Adoxophyes orana* is briefly described. Overwintering larvae can seriously damage young forced lilac flowers. Control measures recommended are a preliminary winter wash, followed by a DDT, lindane or parathion spray applied when the larvae become active, namely about the third day of forcing.—Rijksst. Insectenleer, Gembloux.

3155. Crum, P.
Chelating agents for the control of lime-induced chlorosis in Southern magnolia.
Proc. nat. Shade Tree Conf. 1954, pp. 267-70.

Southern magnolia (*M. grandiflora*) planted in a calcareous soil showed Fe deficiency symptoms within 2 years. Soil applications of Sequestrene (technical sodium ferric ethylenediamine tetra-acetic monohydrate) at 2 oz. per tree showed beneficial results within 6 weeks. Soil injections using 6 oz. of Sequestrene dissolved in water per tree also gave very good results with both magnolia and camphor trees.—Palo Alto Park, Calif.

3156. Wells, J. S.
Propagating *Osmanthus americanus*.
Amer. Nurserym., 1955, **101** (7): 14-15, illus.

Various growth substance treatments were tested in an attempt to promote rooting in *Osmanthus americanus* cuttings. All the cuttings, taken in August, were wounded and placed in a peat-sand mixture over bottom heat. Treatment with a very strong proprietary hormone compound, Cut-Start 18-X, resulted in 70% of strongly rooted cuttings by February, whereas weaker concentrations and 2% indolebutyric acid gave less satisfactory results and only 5% rooting was obtained in the untreated controls. Retreatment of the poorly rooted cuttings in February with the strong proprietary substance gave vigorous rooting. It is suggested that January or February may be a better time than August for taking the cuttings.

3157. Wister, J. C., and Wolfe, H. E.
The tree peonies.
Nat. hort. Mag., 1955, **34**: 1-61, bibl. 39, illus.

This short monograph on the tree peonies deals with botany, history of the Chinese, Japanese and Delavay types, culture, propagation by division, layers, cuttings, grafts and seed, and pests and diseases. Lists are appended of public and private collections in the U.S.A., nurserymen stocking tree peonies, and importers. There is also an alphabetical list of more than 400 varieties indicating where specimens of each can be seen or obtained.

3158. Kosugi, K., and Miyoshi, Y.
Studies on flower bud differentiation and development in some ornamental trees and shrubs. IV. The time of flower bud differentiation and flower bud development in *Spiraea thunbergii* Sieb. and *S. cantoniensis* Lour.
[Japanese, with English summary ⅓ p.]
J. hort. Ass. Japan, 1954, **23**: 172-6, bibl. 5, illus.

Dates of differentiation of the inflorescence and of the various organs of the flower, and of flowering, in *Spiraea thunbergii* and *S. cantoniensis* are recorded for 2 seasons in Japan. In both species inflorescence differentiation occurred in the second half of October in lateral buds on shoots formed in the current season.

Noted.

3159.

a Anon.
La floricultura en Venezuela. (**Flower growing in Venezuela.**)
Agric. venezol., 1954, **19** (172): 27-9.
Costs and returns for roses, gladioli, orchids and lilies.

b Anon.
Ringelblumen-Sorten. (**Marigold variety trials.**)
Schweiz. Gärtnerztg, 1955, **58** (22): 2-3, illus.
At St. Gallen Botanic Garden, Switzerland.

c Aristeguieta, L.
El cují yaque (*Prosopis juliflora* (Swartz) D.C.). (***Prosopis juliflora.***)
Agric. venezol., 1954, **19** (170): 38-40, illus.
Distribution and uses (ornamental, fruits for fodder) in Venezuela.

d Basteleus, R.
La théorie des couleurs appliquée aux plantations florales. (**The theory of colour applied to flower beds.**)
Bull. hort. Liège, 1955, **10**: 8-11, bibl. 2, illus.
Rules on the matching of colours in flower beds.

e Braun, O.
Zierbäume und -pflanzen in Bolivien. (**Ornamental trees and plants in Bolivia.**) [English, French, Spanish summaries.]
Mitt. Klosterneuburg, Ser. B, 1955, **5**: 33-7.

f Brierley, P.
Symptoms in the florists' hydrangea caused by tomato ringspot virus and an unidentified sap-transmissible virus.
Phytopathology, 1954, **44**: 696-9, bibl. 7, illus.

g Dimitri, M. J., and Rial Alberti, F.
Las especies del género *Cassia* cultivadas en la Argentina. (**The species of *Cassia* cultivated in Argentina.**)
Rev. Invest. agric. B. Aires, 1954, **8**: 5-34, bibl. 29, illus.
Botanical descriptions of 14 species.

h Evers, O. R.
Snapdragon culture in Florida.
Proc. Fla St. hort. Soc. for 1954, pp. 339-43.
Culture, diseases and pests.

i Gaarder, P.
Dahlia. Sortskritikk fra sommeren 1954. (**Dahlia variety trials 1954.**)
Gartneryrket, 1955, **45**: 120-2.
Short descriptions of many varieties.

j Geissman, T. A., and Harborne, J. B.
The chemistry of flower pigmentation in *Antirrhinum majus.* IV. The albino (—*mm*—*nn*) form.
Arch. Biochem. Biophys., 1955, **55**: 447-54, bibl. 2.
Parts II and III see 3159m below.

k Hartsema, A. M.
Storage of bulbs. [French summary.]
Reprinted from *Annexe 1951-1 Bull. Inst. int. Froid*, pp. 7, bibl. 15.
Dutch work on flower and onion bulbs reviewed.

l Hoffmann, A., and Kirschner, K.
Arbeitsmethodik und Arbeitsorganisation beim Verpflanzen grösserer Bäume. (**The technique of transplanting large trees.**)
Dtsch. Gartenb., 1955, **2**: 95-6, bibl. 7, illus.

m Jorgensen, E. C., and Geissman, T. A.
The chemistry of flower pigmentation in *Antirrhinum majus.* II. Glycosides of *PPmmYY, PPMMYY, ppmmYY* and *ppMMYY* color genotypes. III. Relative anthocyanin and aurone concentrations.
Arch. Biochem. Biophys., 1955, **54**: 72-82, bibl. 6, and 1955, **55**: 389-402, bibl. 8.
For Part I see *H.A.*, 24: 2950, and Part IV 3159j above.

n Juneja, S. L.
Preliminary note on the occurrence of a possible mutant in *Acroclinium.*
Indian J. Hort., 1954, **11**: 129-30, bibl. 5, illus.
A plant of *Acroclinium* (*Helipterum*) *roseum* with flower clusters in place of single flowers.

o Klougart, A.
15. Beretning fra Fællesudvalget for Bedømmelse og Prøvedyrkning af Prydplanter. (**15th Report of the Committee for Testing Ornamental Plants.**)
Årbog Gartneri 1954, 1955, pp. 213-20.
Variety trials with dahlias, roses and chrysanthemums.

p Kristensen, H. R.
Chrysanthemum-virussygdomme. (**Virus diseases of chrysanthemum.**)
Christtreus Bogtrykkeri, Copenhagen, undated, pp. 6½.

q Leroy, Y.
Contribution à l'étude des variétés de rosiers pour la fleur à couper. (**Contribution to the study of cut-flower varieties of rose.**)
Rev. hort. Algér., 1954, **58**: 255-8.
Varieties recommended for Algeria.

r Lothian, T. R. N.
Salt tolerant plants grown in South Australia.
Proc. Fla St. hort. Soc. for 1954, pp. 293-7, illus.
Mainly trees and shrubs.

s MACCARIO, G.
I gladioli più coltivati nella "Riviera dei fiori". **(The principal gladiolus varieties of the Italian Riviera.)**
Riv. Ortoflorofruttic. ital., 1955, **39**: 68-71.
Some 35 varieties briefly described.

t MATTOON, H. G.
Growing rhododendrons and azaleas in limestone areas.
Horticulture, Boston, June, 1954, condensed in *Brooklyn bot. Gdn Rec.*, 1954/55, **10**: 261-4, illus.
By planting in peat on top of the ground.

u MILANO, V. A.
Las especies del genero *Osmanthus* cultivadas en el pais. **(The species of *Osmanthus* cultivated in Argentina.)**
Rev. Invest. agríc. B. Aires, 1952, **6**: 281-8, bibl. 12, illus [received 1955].
Botanical notes on *Osmanthus fragrans* and *O. ilicifolius.*

v MINISTRY OF AGRICULTURE, LONDON.
Chrysanthemum eelworm.
Adv. Leafl. Minist. Agric. Lond. **339,** revised 1954, pp. 5, illus.
Aphelenchoides ritzema-bosi, symptoms and control.

w MINISTRY OF AGRICULTURE, LONDON.
Commercial anemone growing.
Adv. Leafl. Minist. Agric. Lond. **353,** revised 1955, pp. 6.
St. Brigid and de Caen types.

x MIRIĆ, S., AND PEJIN, D.
A study of the efficiency of flower seed production. [Serbian, with English summary 1½ pp.]
Rev. Res. Work Fac. Agric. Belgrade, 1954, **2** (2): 3-28.
Economic comparisons with other crops in Yugoslavia.

y MIRIĆ, S., AND PEJIN, D.
Analysis of labour requirements for the production of flower seed and competitive crops. [Serbian, with English summary 1½ pp.]
Rev. Res. Work Fac. Agric. Belgrade, 1954, **2** (2): 29-48.
As part of a large arable farm in Yugoslavia.

z MOLINARI, E. P., AND FABRIS, H. A.
Los *Hibiscus* cultivados en la Republica Argentina. **(The *Hibiscus* spp. cultivated in Argentina.)**
Rev. Invest. agríc. B. Aires, 1954, **8**: 289-310, bibl. 10, illus.
Botanical descriptions of 15 species.

3160.

a NUPNAU, C.
Verkürzte Kultur bei Lorraine-Begonien. **(Shortening the growing period of Gloire de Lorraine begonias.)**
Gartenwelt, 1955, **55**: 85, illus.
Danish method of cultivation.

b VON OPPENFELD, H.
Michigan floricultural production.
Quart. Bull. Mich. agric. Exp. Stat., 1954, **37**: 35-51, bibl. 3.
Statistics.

c VON OPPENFELD, H.
Retail distribution of floricultural crops in Michigan.
Quart. Bull. Mich. agric. Exp. Stat., 1954, **37**: 52-9.

d REIMANN-PHILIPP, R.
Zuchtziel "höhere Glöckchenzahl" bei Maiblumen. **(Breeding lily-of-the-valley for more flowers per spike.)**
Gartenwelt, 1955, **55**: 107-9.

e RIAL ALBERTI, F.
Las especies del genero *Ruscus* cultivadas en la Argentina. **(The species of *Ruscus* grown in Argentina.)**
Rev. Invest. agríc. B. Aires, 1952, **6**: 123-9, illus. [received 1955].
Botanical descriptions of *R. aculeatus*, *R. hypoglossum* and *R. hypophyllum.*

f RICHARDSON, A. M.
Propagating the athel tree.
Qd agric. J., 1954, **79**: 335-7, illus.
Tamarix aphylla, propagation by cuttings and transplanting for use as a shelter belt.

g ROOME, B. W.
Management and maintenance of an industrial sports ground.
J. Sports Turf Res. Inst., 1954, **8**: 413-22.

h SCHNITZIUS, H. J., AND CUNNINGHAM, W. A.
Survey of evergreen *Euonymus*.
Amer. Nurserym., 1955, **101** (7): 9-10, 60-3, illus.
Descriptions of 16 varieties with notes on growth habits and uses.

i SHEEHAN, T. J.
Recent advances in the storage of cut flowers.
Proc. Fla St. hort. Soc. for 1954, pp. 304-7.
Long-term, low temperature storage discussed.

j SMITH, B. C.
Processing of cuttings.
[*Mimeo. Publ.*] *Dep. orn. Hort., Calif. St. Polytech. Coll.*, 1955, pp. 6, illus.
General advice on types of cuttings, media and treatment with fungicide/insecticide dips and hormones.

k STEVENSON, J. B.
Commercial chrysanthemum growing.
Agriculture, Lond., 1955, **62**: 68-72.

l THÉAU, A.
La culture des asters au Jardin d'Essai de 1950 a 1954. (**Aster culture at the Experimental Garden, 1950/54.**)
Rev. hort. Algér., 1955, **59**: 21-3.
Notes on 10 varieties in Algeria.

m WILKIN, F. E.
The Mount Fuji flowering cherry.
N.Z. J. Agric., 1955, **90**: 270, illus.
Prunus speciosa var.

n WILSON, G. F., AND RAMSBOTTOM, J.
The enemies of the rose.
National Rose Society, London, 3rd edition, 1954, 7×5 in., pp. 154, illus., 7s. 6d.
A new edition of this standard work on diseases and pests and their control.

o ZECK, E. H.
The oleander butterfly, *Euploea corinna.*
Agric. Gaz. N.S.W., 1955, **66**: 89-90, illus.
Life cycle and control.

SUB-TROPICAL FRUIT AND PLANTATION CROPS.

General.

(*See also* 3241j, m, w, y.)

3161. MARLOTH, R. H.
Citrus and subtropical fruit research.
[Forming part of the Annual Report of the Secretary for Agriculture, Union of South Africa, for the year ending 31 August, 1954.]
Fmg S. Afr., 1955, **30**: 160-5.

Citrus: Statistical analyses of results from a long-term citrus rootstock trial have led to the following major conclusions: on light soils, rough lemon gave the highest total yields in the first 15 years of production with Washington and Pretoria navels, Valencias, Lisbon lemons and Triumph grapefruit; on heavier soils, rough lemon gave the highest Navel and Valencia yields for the first 5 years, but after that was equalled by sweet orange stock; mid-season orange varieties on heavier soils gave higher yields on sweet orange than on rough lemon; Empress mandarin was a promising orange rootstock. In the long-term irrigation project at Alkmaar trees irrigated by furrows yielded less than those irrigated by basins; trees in plots irrigated over the whole of the soil surface gave significantly higher yields than those irrigated on only one side of the tree. In time-of-harvesting experiments significantly higher yields of Valencias were obtained when the crop was harvested before or at flowering; there was a significant decrease in the fruit set of a normal crop when an out-of-season crop was allowed to ripen on the tree. *Subtropical fruits:* After a severe frost (−1·5° C.) jackfruit, cashew, true pepper, coffee and cinnamon showed the worst damage; West Indian avocadoes suffered more than Guatemalan; young mango trees were more damaged than older ones; litchis were only slightly damaged. *Vegetables:* Work reported includes tomato and onion fertilizer trials, and tomato irrigation and variety trials. *Plant breeding:* with papaw, citrus, mango and avocado. *Pest control:* citrus red mite was successfully controlled in the field by parathion in combination with spray oil and by ovotran, DN 111, aramite and malathion; mango scale was controlled by parathion. *Plant Pathology:* good control of citrus black spot was obtained with 2: 1: 80 bordeaux and 1½ lb. bound copper in 80 gal. water. *Storage:* Polythene wrappers enabled Fuerte avocadoes to survive a transit period to shipping ports of up to 7 days.

3162. OCHSE, J. J., AND IWANIEC, W. J.
Study on root development.
Proc. Fla St. hort. Soc. for 1954, pp. 217-18.

Preliminary studies were made on the possibility of rooting cuttings in a nutritional spray mist. The basal end of the cuttings projected about 4 in. into the mist chamber, where they remained for 10 weeks before being set out in the field. Governor's plum, yellow ixora, carissa and a guava rooted satisfactorily. Litchi and rose apple showed much callusing but little rooting under these conditions. Several other species failed to root or callus.

Avocadoes.

(*See also* 3241t.)

3163. WINSLOW, M. M., AND ENDERUD, J.
Avocado variety investigations.
Calif. Agric., 1955, **9** (2): 10, 14.

A progress report on avocado varieties in the experimental orchard at Riverside shows Zutano, Duke, Emerald, Hass, and Ryan to be the most promising. Yields of all the Fuerte strains were disappointing. Recent eliminations from the trials have been Regina, Tomko, Sonora, Hartman, Campbell, Halsted, Tantlinger, Nowels, Fuerte Fairbanks and Silliman. Additional new varieties under trial are listed. [See also *H.A.*, 24: 3012.]

3164. SCHROEDER, C. A., AND FROLICH, E. F.
Avocado rootstock-scion studies.
Calif. Agric., 1955, **9** (2): 11-12, illus.

Many introduced *Persea* species have been tested in avocado rootstock-scion studies in California. Successful bud or graft unions have been obtained with *Persea floccosa*, *P. longipies*, *P. schiedeana*, *P. gigantea*, *P. nubigena*, and *P. melanocarpa*. Among those which appear to be completely incompatible are *P. borbonia*, *P. indica*, *P. skutchii*, and *P. lingue*. Other genera tested and found incompatible were the Californian bay (*Umbellularia californica*), Grecian laurel (*Laurus nobilis*) and camphor tree (*Cinnamomum camphora*).

3165. GILLESPIE, H. L.
Bud formation in avocado root tissue.
Calif. Citrogr. 1955, **40**: 160.

An example is mentioned of shoot development from the remains of the tap-root of an avocado tree which had been removed the previous year. This suggests the possibility of using root cuttings for propagating selected rootstocks.

3166. LYNCH, S. J., GOLDWEBER, S., AND RICH, C. E.
Some effects of nitrogen, phosphorus and potassium on the yield, tree growth, and leaf analysis of avocados.
Proc. Fla St. hort. Soc. for 1954, pp. 220-4, bibl. 7.

A manurial trial was started in 1952 with 4 commercial avocado varieties, to which different rates of N, P and K were applied. Preliminary results show that variations in N level appeared to have had a direct effect on trunk growth, tree size, condition and yield of the 4 varieties, whereas variations in P and K levels have had little influence on tree appearance or fruit yield. Increases in N level were reflected in the leaf by increased N and decreased K. Increased K applications resulted in increased leaf K without affecting leaf N. At the lower N levels there was a tendency for increased leaf P with increased P applications.

3167. Haas, A. R. C., and Brusca, J. N.

Chloride toxicity in avocados.

Calif. Agric., 1955, **9** (2): 12-14, illus.

The effects of ammonium nitrate, ammonium sulphate and di-hydrogen phosphate in reducing chloride toxicity were studied in avocado seedlings grown in sand and water cultures which received nutrient solutions containing excess chloride. Seedling response varied; Mexicola (Mexican) seedlings showed the most severe chloride injury regardless of the form of N added. Harman (Mexican) seedlings in sand cultures receiving di-hydrogen phosphate showed the least severe injury. Analyses of Topa Topa seedlings showed relatively little variation in chloride content under the different treatments. There were indications that, under similar conditions, Mexican seedlings contained a higher percentage of chloride in leaves and rootlets than did Guatemalan seedlings.

3168. Peterson, P. A.

The avocado flower cycle as related to pollination and fruit set.

Citrus Leaves, 1955, **35** (3): 8-9, 23, 25, illus.

Avocado pollination and fruit set.

Calif. Citrogr., 1955, **40**: 250-1, bibl. 7.

The first paper describes how a time-lapse cinema film was used to study the dual opening cycle of a Zutano (type B) avocado flower on a tree growing in a glasshouse. In Stage I on the first day the flower changed from a closed to an open position with the receptive stigma exposed in the space of 5 minutes starting at 2.50 p.m.; the flower remained open for 3 hours 40 minutes and then closed over a period of 42½ minutes. No pollen was shed by any flowers on this tree during, or in the 2 hours preceding, this Stage I opening. The opening of the same flower in Stage II started before sunrise on the following day but more than 2 hours elapsed before pollen was exposed.

Both papers describe a trial in which Zutano and Hass (type A) trees were caged, with and without beehives installed in the cages. With bees the trees set 120 and 284 fruits compared with 4 and 5 fruits without bees. This result indicates that bees can effect self-pollination between different flowers on the same tree during the short period when Stages I and II overlap.—Calif. Citrus Exp. Stat., Riverside.

3169. Frezzi, M. J.

Presencia de *Botryosphaeria ribis* en el República Argentina y su importancia económica. **(The presence of *Botryosphaeria ribis* in Argentina and its economic importance.)**

Rev. Invest. agríc. B. Aires, 1952, **6**: 247-62, bibl. 8, illus. [received 1955].

This paper includes notes on the control of trunk cankers due to *Botryosphaeria ribis* in avocado by excising infected tissue and applying mercury bichloride and then bordeaux mixture and on the protective treatment of pruning wounds. Other tree species which have been attacked by this pathogen in Argentina are *Chamaecyparis lawsonlana*, *Platanus acerifolia* and *Eucalyptus* sp.

3170. Brown, E. S.

***Xyleborus morstatti* Hag. (Coleoptera, Scolytidae), a shot-hole borer attacking avocado pear in the Seychelles.**

Bull. ent. Res., 1954, **45**: 707-10, bibl. 10, illus.

An account is given of this occasional pest, the injury it causes and its control on a small scale with a 10% emulsion of Aldrex (containing 2·44% aldrin at this dilution).

3171. Young, T. W., and Ruehle, G. D.

Parasitic nematodes on avocados—a preliminary report.

Proc. Fla St. hort. Soc. for 1954, pp. 280-4, bibl. 3, illus.

Both the burrowing nematode (*Radopholus similis*) and meadow nematodes (*Pratylenchus* spp.) have been found in avocado groves in Florida, and are associated with root lesions. In a pot experiment avocado seedlings growing in nematode-free, sandy soil did not show decline symptoms 5 months after the start of nematode inoculations.

3172. Harkness, R. W.

Chemical and physical tests of avocado maturity.

Proc. Fla St. hort. Soc. for 1954, pp. 248-50, bibl. 3.

Determinations of oil content and specific gravity and pressure tests have not proved to be reliable indicators of avocado maturity in Florida.

3173. Harding, P. L.

The relation of maturity to quality in Florida avocados.

Proc. Fla St. hort. Soc. for 1954, pp. 276-80, bibl. 5.

Several commercial varieties were tested for maturity and quality during the 1953-54 season. The fruit was stored at 75° F. Softening was fairly uniform and the time required for fruit to mature was 3–10 days. The loss of weight in stored fruits averaged about 5%. Total decay was commercially unimportant. Varietal fruit maturity could be fairly well defined on the basis of specified picking dates in conjunction with minimum weight.—U.S. Dep. Agric., Orlando, Fla.

Citrus—general.

(*See also* 2386, 3241f, i, l, o, p, u, v, 3244, 3406.)

3174. Philippe, J., van Laere, R., and van Dingenen, A.

Plantations d'agrumes au Congo belge. Conseils pratiques concernant son établissement et son entretien. **(Citrus plantations in the Belgian Congo. Practical advice on their establishment and maintenance.)** [Flemish summary 1 p.]

Bull. agric. Congo belge, 1955, **46**: 57-77, illus.

Though derived from experience at the INEAC research station at Mvuazi in the Lower Congo the advice applies, it is said, to other localities. The following are among the subjects covered: varieties (Cadena sin hueso (seedless) orange on rough lemon, Oneco mandarin on its own roots or on rough lemon, Hertaciones (four seasons) lemon on rough lemon or sour orange), layout, nursery practice, budding, cover crops (*Pueraria javanica* or *Flemingia rhodocarpa*), intercropping (pineapple or other crops until the citrus comes into bearing), manuring, pruning and control of diseases and pests.

3175. Nauer, E., and Moore, P. W.
A system of orchard appraisal.
Calif. Citrogr., 1955, **40**: 120, 130-2, bibl. 4, illus., and *Citrus Leaves*, 1955, **35** (3): 6-7, 26-7, bibl. 4, illus.

A system of orchard appraisal which has been used in an extensive survey of California orange orchards is reported. This method of orchard mapping differs from previously reported methods in that specific causes of poor tree health and production are recorded in detail. Symbols are used to represent diseases such as psorosis and gummosis, and the stage of development of the disease is noted. Any tree of subnormal size or vigour is recorded on the orchard map by an appropriate symbol. The maps give a complete picture of the orchards including bearing potential, disease incidence and general tree health. [From authors' summary.]

Citrus—varieties, rootstocks and propagation.

(*See also* 3241b, s, 3398.)

3176. Gomez, L. G., and Gonzalez, L. G.
Outstanding varieties and forms of pummelo, *Citrus grandis* (Linn.) Osbeck in nine towns of the Mountain Province.
Philipp. Agric., 1954, **37**: 593-610, illus.

None equalled the Siamese pummelo in eating quality, size of fruit or growth rate, but they might be useful as stocks for other citrus in the Philippines.

3177. Beñatena, H. N.
Métodos para identificar porta-injertos en árboles cítricos: prácticos, histológicos y colorimétricos de laboratorio. **(Field, histological and colorimetric methods of identifying citrus rootstocks.)**
Rev. Invest. agríc. B. Aires, 1954, **8**: 69-94, bibl. 25, illus.

Information is given on the macroscopic characters of shoots and the histological characters of shoots and roots of different rootstocks, on the appearance of the graft unions of various stock-scion combinations and on the colour reactions of aqueous bark extracts of a number of rootstocks with 4 different reagents. The reagents were Almen (potassium hydrate and copper sulphate), ferric chloride, ammonium molybdate and titanium chloride. The 15 rootstocks were sweet and bitter orange, rough and Geneva lemon, *Poncirus trifoliata*, Rangpur and Persian lime, common and Cleopatra mandarin, grapefruit, citron, calamondin, limequat, Sampson tangelo and toronja.

3178. Ivanovskaja, A. A.
The growth and formation of Chinese lemon on different rootstocks. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1955, **100**: 1013-15, bibl. 1.

Trench cultivated Chinese dwarf (Meyer) lemons grew much more vigorously on lemon and sweet orange rootstocks than on sour orange rootstocks. The growth of control plants on trifoliate orange was intermediate. Comparisons over 3 years between the most vigorous plants, i.e. those on lemon, and the controls showed that the biggest difference in growth rate was during the first season.

3179. Mišić, P. D., and Pavićević, B. M.
Uticaj sintetičkog fitohormona kalijumove soli alfa-naftalinsirćetne kiseline na ožiljavanje reznica limuna (*Citrus lemon* Burm.). **(The effect of the potassium salt of alpha-naphthylacetic acid on the rooting of lemon cuttings.)** [English summary ½ p.]
Arh. poljopr. Nauk., 1954, **7** (17): 85-95, bibl. 9, illus.

The bases of 3–10 mm. thick, 10–15 cm. long lemon cuttings, with and without 2–3 leaves, were treated with from 0·001 to 0·2% concentrations of the potassium salt of NAA (Regulex) for 24 hours. The best rooting responses were obtained with 0·01 and 0·005% concentrations. Higher concentrations induced more rapid rooting but were phytotoxic, while the response to a lower concentration was too slow. The size of the cuttings did not affect rooting nor did the absence of leaves. The shoot growth made by cuttings with 2–3 original leaves was, however, somewhat better than that of cuttings without leaves.

3180. Sutton, N. E.
Marcotting of Persian limes.
Proc. Fla St. hort. Soc. for 1954, pp. 219-20.

By comparison with budded trees, trees raised by marcotting appear to possess exceptional vigour and fruiting capacity, with earlier fruit production. Marcotting of limes is outlined. In Florida the approximate cost of a budded lime is 58 cents, while a marcotted lime costs 83 cents. Preliminary studies indicate that the latter are less susceptible to attack by Florida red scale (*Chrysomphalus aonidum*).

Citrus—growth phenomena and physiology.

(*See also* 3241d, k.)

3181. Ford, H. W.
Root distribution in relation to water table.
Proc. Fla St. hort. Soc. for 1954, pp. 30-3, bibl. 2.

Root distribution in orange and grapefruit groves with drains providing a stabilized water table was compared with that in an undrained grove with a fluctuating water table. Lowering the water table from 30 in. to 70 in. doubled the quantity of feeder roots and increased tree size. The feeder root concentration of the deep-rooting trees was greater in the 30–70 in. zone than in the 0–10 in. zone and considerably higher than usual for trees on deep well-drained sands. Trees with more than 13 g. of dried feeder roots in a square foot column 30 in. deep were larger than those with less than 13 g.;

trees with a feeder root concentration of less than 9 g. showed typical water damage symptoms.

3182. Mirimanjan, V. A.
A study of the physiology of a mandarin vegetative hybrid. [Russian.]
Agrobiologija, 1955, No. 1, pp. 70-5, bibl. 7.

The mandarin-vegetative hybrid was raised from a callus bud occurring at the point of union between an Unshiu mandarin and *Poncirus trifoliata*, but the characters of the latter species predominated. It is more frost resistant than the mandarin, produces only one spring flush, is semi-deciduous and bears small but edible fruits possessing something of the flavour of trifoliate orange. On shoots of bearing trees of the hybrid 3 types of leaves occur, some being typical of mandarin, others of trifoliate and others intermediate in form. For chemical analysis of leaves equal proportions of all 3 types were used. They were found to contain a higher percentage of water than the leaves of both the parents and had a greater water retaining capacity, which is believed to be the cause of their greater frost resistance. The ascorbic acid, total nitrogen and protein contents of the leaves were intermediate between those of the two parents, but the soluble nitrogen content was higher than that of either parent. In catalase activity the leaves of the hybrid were intermediate between those of the parents in a bearing year but lower in a non-bearing year.

Citrus—tree composition and nutrition.

(*See also* 2478, 3241h, 3246.)

3183. Reuther, W., and Smith, P. F.
Leaf analysis as a guide to the nutritional status of orchard trees.
Plant Analysis and Fertilizer Problems, [1955], pp 166-80, bibl. 48, I.R.H.O. Paris, being part of *Proc. 8th int. bot. Congr. 1954*.

The authors discuss leaf analysis as a guide to the nutritional status of fruit trees. Tentative standards are presented for a classification of the nutrient status of Valencia orange trees based on the concentration of mineral elements in 4- to 7-month-old, spring-cycle leaves from non-fruiting terminals. The interpretation of these values is discussed.—U.S.D.A., Florida.

3184. [Heymann-] Herschberg, L.
Leaf composition in relation to nitrogen and phosphorus requirements of citrus trees in Israel.
Plant Analysis and Fertilizer Problems, [1955], pp. 191-202, bibl. 24, I.R.H.O. Paris, being part of *Proc. 8th int. bot. Congr. 1954*.

The N and P nutrition of citrus trees in Israel was studied by means of leaf analysis. The effects of factors, other than nutrient supply, which cause changes in leaf composition are discussed. The N and P contents of lemon and grapefruit leaves were lower than those of orange and Clementine leaves. Although N percentages varied little on different rootstocks, a correlation between scion/rootstock compatibility and P percentage is suggested. In an N fertilizer experiment vegetative growth was promoted by applications which affected fruit quality adversely. Thus in standardizing leaf analysis values no single criterion of tree performance should be considered.—Agric. Res. Stat., Rehovot.

3185. Wander, I. W.
Availability of phosphorus, potassium and magnesium from insoluble sources as indicated by the growth and leaf analysis of sweet orange seedlings.
Proc. Fla St. hort. Soc. for 1954, pp. 60-6, bibl. 5, illus.

Six insoluble sources of P, K, and Mg were used singly and in combination in a pot experiment with sweet orange seedings grown in soil deficient in these elements. Both colloidal phosphate and raw ground rock phosphate resulted in increased growth over no P in proportion to the rate used, but neither source gave as good growth as a soluble phosphate source. There was no increase in growth or leaf-K content after applications of finely-ground granite or felspar. Both olivine and dolomite proved to be available sources of Mg as measured by growth and leaf-Mg content. The addition of S to the soil did not improve the growth of seedlings treated with all combinations of insoluble P, K or Mg. In a field experiment 3 sources of insoluble K applied to mature grapefruit trees did not increase leaf K.

3186. Harding, R. B.
Organic matter and total nitrogen in southern California orange orchard and adjacent virgin soils.
Soil Sci., 1955, **79**: 277-82, bibl. 11.

A survey was made of the organic matter and total N contents of the soils of 69 southern California orange orchards and of 14 adjacent, representative virgin soils. There were no marked differences between group 1 orchards (high yield and large-sized fruit) and group 2 orchards (low yield and small-sized fruit) in organic matter or total N contents of the soils. There were, however, significant increases in both organic matter and total N in orchard soils when compared with virgin soils. Most of the increases occurred in the surface 6 inches of soil. Comparison of the soil of an orchard noncultivated and unmanured for 30 years with the soils of 3 cultivated, manured orchards showed considerably less organic matter and total N in the noncultivated orchard. [Author's summary.]—Calif. Citrus Exp. Stat., Riverside.

3187. Reuther, W., and Smith, P. F.
Effect of method of timing nitrogen fertilization on yield and quality of oranges.
Proc. Fla St. hort. Soc. for 1954, pp. 20-6, bibl. 15, and *Citrus Ind.*, 1955, **36** (3): 5-7, 12-13, 19, 22, bibl. 10.

Trials in Central Florida were continued for 7 years with N manuring of oranges on rough lemon. Results indicated that neither time nor number of N applications profoundly affected yield or tree vigour. The annual dose was equally effective in 1, 3 or 6 applications. The effect of N timing was generally not of practical significance for fruit quality, though a single dose applied in autumn to Hamlin produced fruit of slightly higher juice content and earlier maturity than the same dose applied in 3 treatments.

3188. Oberbacher, M. F.
A chlorosis of citrus produced by biuret as an impurity in urea.
Proc. Fla St. hort. Soc. for 1954, pp. 67-9, bibl. 2, illus.

Biuret, which occurs as an impurity in commercial urea, caused chlorosis on citrus when used as a foliar spray or soil application. In the summer chlorosis appeared within 3 weeks of application, while in winter chlorosis was delayed for as long as 15 weeks. The youngest leaves at the time of spraying were the most susceptible, and those developing after biuret application were not affected.

3189. Bingham, F. T., and Martin, J. P.
Effects of phosphorus on minor elements.
Calif. Citrogr., 1955, **40**: 246-9, bibl. 16.
Effects of phosphorus fertilization on the minor element nutrition of citrus.
Citrus Leaves, 1955, **35** (6): 8-9, 28, bibl. 16.

Two experiments are described in which monocalcium phosphate was applied in amounts equivalent to 0 to 900 lb. P per acre-6 inches, (1) to Lisbon and Eureka lemons on Cleopatra mandarin and Jochimsen grapefruit rootstocks growing in one soil type and (2) to sour orange seedlings growing in 3 soil types, with and without additions of copper sulphate. Leaf analyses showed that Fe and Mn were little affected by increasing supplies of P but that Cu and Zn were reduced by high P to deficiency levels. The effect of excess P in reducing growth was more pronounced in the lemon trees on mandarin stock than in those on grapefruit stock.—Calif. Citrus Exp. Stat., Riverside.

3190. Martin, J. P., Bitters, W. P., and Ervin, J. O.
Influence of soil factors on trifoliate seedlings.
Calif. Citrogr., 1955, **40**: 199, 201, bibl. 4.
Influence of certain soil chemical properties on growth of trifoliate.
Citrus Leaves, 1955, **35** (6): 10-11, bibl. 4.

Trifoliate orange seedlings were grown in pots containing two soils treated to provide varying degrees of acidity and to contain varying amounts of K and Na. Radish and lettuce seedlings were grown in one soil for comparison. The trifoliate seedlings grew almost equally well in acid soil (pH 5·5), neutral soil and soil containing excess lime (pH 7·7). K reduced growth when it reached about 12% in loam soil and 20% in sandy soil. Na reduced growth in concentrations ranging from 7 to 16%. The results show that the trifoliate orange is more sensitive to high K or Na or both than are the radishes and lettuces tested in this trial or than sweet and sour oranges tested earlier [see *H.A.*, 24: 768].

3191. Haas, A. R. C., and Brusca, J. N.
Sodium-calcium nutrition in young citrus plants.
Citrus Leaves, 1955, **35** (2): 9, 20, illus.

Rooted sweet orange cuttings were grown in sand culture supplied with a nutrient solution in which concentrations of Na and Ca were varied. There were 16 concentrations of Na ranging from 0 to 365 p.p.m. and 16 of Ca ranging from 0 to 317 p.p.m., the lowest Na being used with the highest Ca and *vice versa*. The results after 11 months showed that growth was adversely affected as Na increased and Ca decreased. Increasing concentrations of Na resulted in increased K %D.M. in leaves and twigs, increased Na %D.M. and K %D.M. in roots and in much reduced fresh and dry weights of the roots. In a second trial varying amounts of Na were supplied to 7 different rootstocks grown in soil cultures supplied with abundant Ca. Although there were some differences between species, the general tendency was for the Ca and Mg contents of the roots to remain unaffected by changes in Na concentration. [See also *H.A.*, 24: 4204.]

3192. Smith, P. F.
Boron deficiency in Florida citrus groves.
Proc. Fla St. hort. Soc. for 1954, pp. 69-73, bibl. 9, illus.

Many young, bearing citrus trees on sweet and sour orange were observed to have a considerable amount of gummed fruit and to drop much young fruit. Affected trees showed gum formation in the peel and axial region, with misshapen and undersized fruit. The leaves did not show severe B deficiency symptoms, but analyses revealed a low B content. These results indicate that production may be affected by B deficiency without the appearance of clearly defined leaf symptoms.

3193. Haas, A. R. C., and Brusca, J. N.
Fluorine toxicity in citrus.
Calif. Agric., 1955, **9** (3): 15-16, illus.

Rooted lemon cuttings growing in sand culture showed reduced growth and leaf tip-burn when fluorine, in the form of sodium or potassium fluoride, was added to the nutrient solution. As little as 50 p.p.m. affected the plants and 400 p.p.m. caused severe injury.

3194. Kuykendall, J. R.
Survey of iron deficiency in Florida citrus.
Citrus Mag., 1955, **17** (7): 14-16.

A survey was made to determine the iron content of citrus leaves in groves throughout Florida. The mean leaf iron content for all varieties in all locations was found to be 66·6 p.p.m. Separation of the data according to rootstocks showed that, in general, trees on rough lemon had higher leaf iron values than those on sour orange. Valencia oranges had the highest average iron content and Pineapple and Temple oranges relatively low contents. Other varieties were at or near the over-all average iron content.

3195. Wallihan, E. F.
Relation of chlorosis to concentration of iron in citrus leaves.
Amer. J. Bot., 1955, **42**: 101-4, bibl. 15, illus.

Leaves from iron-chlorotic trees in California were collected and washed before analysis. The critical concentration of Fe in citrus leaves was about 80 p.p.m. of dry matter [see also *H.A.*, 24: 775]. The chlorosis pattern gave only an approximate indication of the degree of Fe deficiency, and only in the more advanced stages. There was no consistent relationship between the chlorosis pattern or Fe content and the concentration of Na, P or total ash.—Univ. Calif., Riverside.

Citrus—spraying for cultural purposes.

3196. Erickson, L. C., and Richards, S. J.
Valencia orange size and 2,4-D.
Calif. Agric., 1955, **9** (5): 9-10, 14.

Numbers and sizes of fruits were recorded on 30 August on 17-year-old Valencia orange trees, which had been sprayed on 29 May with 16 p.p.m. of the isopropyl ester of 2,4-D or left unsprayed, and which had been irrigated throughout the season to maintain 2 moisture levels, moist and rather dry. 2,4-D reduced the number of small fruits at both moisture levels, but increased the number of large oranges only under the moist soil conditions.

3197. Sites, J. W.
Controlling preharvest drop of Pineapple oranges with 2,4,5-trichlorophenoxypropionic acid.
Proc. Fla St. hort. Soc. for 1954, pp. 56-9, bibl. 6.

A 2,4,5-TP spray reduced preharvest fruit drop of Pineapple oranges. Good control was obtained with 20 p.p.m., and 10 p.p.m. combined with 5 lb. NuGreen per 100 gal. also gave satisfactory results. The time of application did not appear to be critical, significant reductions in drop being obtained with sprays applied up to late February. No leaf curling or malformations have yet been observed at concentrations of up to 60 p.p.m. 2,4,5-TP.

3198. Deszyck, E. J., and Sites, J. W.
The effect of lead arsenate sprays on quality and maturity of Ruby Red grapefruit.
Proc. Fla St. hort. Soc. for 1954, pp. 38-42, bibl. 9.

In fruits sprayed with lead arsenate acidity decreased below that due to the season, high concentrations causing the largest acid loss. The ratio of solids to acid increased substantially in sprayed fruit. Vitamin C and solids also increased, but the increase of solids was not of commercial significance. Fruit sprayed at a low concentration reached legal maturity about 3–5 weeks before unsprayed fruit. At high rates of lead arsenate (0·8–1·6 lb. in 100 gal.) fruit attained legal maturity 5–8 weeks earlier than unsprayed fruit. A rate of 0·8 lb. lead arsenate in 100 gal. is tentatively recommended for promoting early maturity in Ruby Red grapefruit.

Citrus—diseases and pests.

(*See also* 2580, 2718, 2897, 3397, 3408o.)

3199. Philippe, J.
Comment reconnaître et contrôler les principaux ennemis des agrumes au Congo belge. **(Recognition and control of the principal diseases and pests of citrus in the Belgian Congo.)**
Bull. Inf. INEAC, 1955, **4**: 13-25, bibl. 5, illus.

The diseases and pests in question include tristeza, psorosis, gummosis (*Phytophthora* sp.), scab (*Elsinoë fawcetti*), bacterial canker (*Phytomonas citri*), purple scale (*Lepidosaphes beckii*) and rust mite (*Phyllocoptruta oleivora*). A spray calendar is given for the Bas-Congo and Bas-Fleuve regions.

3200. Moore, P. W.
Underground problems brought to surface.
Calif. Citrogr., 1955, **40**: 251-2, illus.

The results are given of a study of root injuries occurring in 3 orchards that were grubbed at ages ranging from 45 to over 60 years. All 3 orchards were on sweet orange rootstock, and prior to bulldozing the trees had shown varying degrees of unthriftiness. The most surprising discovery was that, although above-ground evidence indicated that only a few gophers were present, gopher injury to the roots was moderate to severe in 15, 33 and 60% of the trees in the 3 orchards. The investigation also emphasized the susceptibility of sweet orange stocks to phytophthora root rots, up to 67% of the trees in one orchard being affected by this disease.

3201. Moore, P. W., and Nauer, E.
Psorosis takes a heavy toll.
Calif. Citrogr., 1955, **40**: 152-3, bibl. 1, illus.

An earlier paper [*H.A.*, 25: 2027] indicated the extent to which successive stages of psorosis or scaly bark depress yields in Valencia oranges. Data now presented emphasize that although the disease develops progressively and may take several years to render a tree unproductive, its progress is more rapid than is generally believed.

3202. McClean, A. P. D., and van der Plank, J. E.
The role of seedling yellows and stem pitting in tristeza of citrus.
Phytopathology, 1955, **45**: 222-4, bibl. 3.

It is suggested that the tristeza virus complex has 2 components: a stem-pitting component, able on its own to cause stem pitting in grapefruit, and a seedling yellows component [see *H.A.*, 22: 4261] that by definition must also be present to cause severe stunting and yellowing of seedlings of Eureka lemon, sour orange or grapefruit. Sweet-orange and mandarin trees on their own roots escape severe injury because, although they are infected with the whole tristeza virus complex, they are reasonably tolerant of it; but on rootstocks like sour orange or grapefruit that are intolerant of seedling yellows they suffer severely after the virus complex has crossed the graft union. Eureka lemon and sour-orange scions (on their own or any roots) ordinarily escape severe injury under conditions of natural infection because they do not become infected with the whole complex, but only with a part, the stem-pitting component, to which they are fairly tolerant. Grapefruit as a scion also accepts the stem-pitting component with exclusion of the seedling yellows component; however, because of sensitivity to this component, grapefruit shows symptoms of decline, doing so relatively slowly on its own roots but rather faster on sour orange. [From authors' summary.]—Dep. Agric., Pretoria, S. Africa.

3203. Costa, A. S., Grant, T. J., and Moreira, S.
Behavior of various citrus rootstock-scion combinations following inoculation with mild and severe strains of tristeza virus.
Proc. Fla St. hort. Soc. for 1954, pp. 26-30, bibl. 14, illus.

Sweet orange, grapefruit, lime and tangerine were budded on sweet and sour orange stocks and inoculated with mild or severe strains of tristeza virus. All scions made very poor growth on sour orange rootstocks when inoculated with a severe strain. Sweet orange and tangerine on sweet orange made equally good growth when infected with mild or severe strains of the virus. Grapefruit and lime on sweet orange grew slightly better when infected with mild strains than with a severe strain. In the 3-year period of the experiment the susceptibility of uninoculated controls to natural infection was: lime 100%, sweet orange 76%, tangerine 60% and grapefruit 20%. There was a tendency for naturally infected plants to show severe symptoms.

3204. Griffiths, J. T.
Greasy spot and factors related to its intensity and control in Florida citrus groves.
Citrus Ind., 1955, **36** (5): 7, 10-11, bibl. 4, illus.

Factors believed to affect the incidence of greasy spot on citrus were studied. In a trial with Pink Marsh seedless grapefruit greasy spot was severe in the absence of rust mite infestation, although there were indications that rust mite could be a contributory factor. Greasy spot developed more slowly on oil-sprayed trees than on parathion-sprayed trees. In a survey of greasy spot incidence in 6 citrus varieties, parathion-sprayed groves had a higher average incidence than oil-sprayed groves. July applications of actidione, copper or zineb for greasy spot control resulted in less greasy spot than May or August sprays in the 1954 season. There were distinct varietal differences in greasy spot prevalence, grapefruit being more affected than oranges, which were in turn more affected than tangerines or Temple oranges. Other factors which appeared to contribute to greasy spot incidence were age (young trees being more susceptible), southern aspect, disease status, and fertilizer and spray programmes.

3205. Chowdhury, S.
Citrus scab in Assam and its control.
Sci. and Cult., 1955, **20**: 391-3, illus.

A survey showed that citrus scab is of great economic importance in Assam and that the different citrus species and varieties are not equally susceptible, grapefruit, for instance, being partially resistant although severely affected in Florida. Extensive cross-inoculations with many isolates of the fungus did not reveal any biological specialization in *Elsinoë fawcetti*. Further inoculation experiments showed that the susceptibility of leaves is greatest when they emerge from the bud and that of fruits just after petal fall. Five years' observations indicate that incidence and severity of the disease depend very largely on moisture and, to a lesser degree, on temperature at the critical growth phase. During the winter period the disease is carried over on infected leaves and twigs and probably also in the soil. In 3 years' spraying trials it was found that young leaves must be covered with a fungicide as soon as they open, copper sprays giving the best results. In addition, sanitary measures are necessary for effective control. Grafting susceptible varieties on resistant rootstocks failed to transmit resistance to the scion.—Plant path. Lab., Jorhat, Assam.

3206. Carman, G. E.
Ant control with granular formulations of insecticides.
Calif. Citrogr., 1955, **40**: 184, 186-7.
Argentine ant control on citrus.
Calif. Agric., 1955, **9** (5): 10, 16.

The use of such chlorinated hydrocarbon sprays or dusts as dieldrin, heptachlor, chlordane and aldrin to control the Argentine ant, *Iridomyrmex humilis*, and other ant species in citrus groves involves the risk of inadvertently depositing toxic residues on low-hanging fruits. Tests have shown that this hazard can be avoided and equally good control obtained by using granular formulations of these materials spread evenly over the ground. Bentonite granules in a 30/60-mesh granule size proved easier to disperse than vermiculite or ground tobacco-stem granules. Between 2½ and 5% of actual toxicant in amounts of about 100 lb. appear to be needed to treat 1 acre.

3207. Spencer, H., and Selhime, A. G.
New miticides for the citrus red mite (purple mite).
Proc. Fla St. hort. Soc. for 1954, pp. 42-4, bibl. 6, and *Citrus Mag.*, 1955, **17** (9): 14-15, bibl. 6.

Among the miticides tested in combination sprays in 1953 and 1954, Mitox, Isolan, demeton and schradan controlled *Metatetranychus citri* as effectively as oil emulsion, Ovotran, Aramite or EPN. Malathion was also satisfactory when used twice during the year.

3208. Long, W. T., Thompson, W. L., and Reitz, H. J.
Effectiveness of miticides for purple mites in the Indian River area.
Citrus Ind., 1955, **36** (4): 5-7, bibl. 5.

Results are given from 4 field trials on the control of purple mite (*Metatetranychus citri*) on citrus. Oil emulsion was the best of the materials used in 2 trials; DN Dry Mix, DN 111, Neotran and Ovotran gave fairly good results. Good results were also obtained with oil-parathion mixtures and EPN 300 in all 4 trials.

3209. Bajpai, R. N.
A simple method of controlling fruit piercing moths (*Othreis fullonica* Linn. and *O. materna* Linn.).
Sci. and Cult., 1955, **20**: 387, bibl. 3.

In the State of Madhya Pradesh, where the mandarin variety Nagpur Santra is grown on a large scale fruit piercing moths cause serious premature fruit drop, especially in the summer crop. The eradication of alternate hosts in the vicinity is a means of reducing infestation, but baiting with a mixture of molasses, vinegar, water and lead arsenate was shown to be a simpler method of control. About 300 fruit-piercing moths of several species were caught on one acre in 40 days in bottles distributed over the orchard.—Dep. Agric., Nagpur.

3210. Johnson, R. B., and Thompson, W. L.
Studies on the use of malathion on citrus.
Proc. Fla St. hort. Soc. for 1954, pp. 44-9, bibl. 2.

Good control of low infestations of purple scale (*Lepidosaphes beckii*) and Florida red scale (*Chrysomphalus aonidum*) was obtained by malathion sprays of 3–5 lb. of 25% w.p. or 1–2 pints of 57% emulsifiable liquid in 100 gal.; 3 lb. of 25% w.p. also gave excellent control of soft brown scale (*Coccus hesperidum*). Control of chaff scale (*Parlatoria pergandii*) and of heavy infestations of purple scale was variable. Both purple mite (*Metatetranychus citri*) and rust mite (*Phyllocoptruta oleivora*) were readily killed by malathion, but it did not give control for an adequate period.

3211. Elmer, H. S., and Ewart, W. H.
Malathion and malathion-parathion sprays for control of the soft scale on citrus in California.
J. econ. Ent., 1954, **47**: 1131-3, bibl. 4.

Treatments consisting of 0·5, 1·0 and 1·5 lb. of 25% malathion w.p. alone and in combination with 0·5, 1·0 and 1·5 lb. of 25% parathion w.p. per 100 gal. were used in 4 citrus groves against soft scale, *Coccus hesperidum*. The sprays were applied by conventional high-pressure equipment to give a thorough coverage during the winter months where there was very little parasite activity. The most effective treatment was a spray containing 1·5 lb. of malathion plus 0·5 lb. of parathion per 100 gal. which gave 94·4% reduction of scale populations compared with the control.—Calif. Citrus Exp. Stat., Riverside.

3212. Birchfield, W.
The hot water treatment of nematode-infested nursery stock.
Proc. Fla St. hort. Soc. for 1954, pp. 94-6, *Citrus Ind.*, 1955, **36** (3): 10-12, and *Citrus Mag.*, 1955, **17** (9): 16-18, all bibl. 12.

The thermal death-point of the burrowing nematode [*Radopholus similis*] was about 10 min. exposure to 122° F. under the conditions of the experiments described. The tolerance of rough lemon and Cleopatra mandarin seedlings and of crotons lies well beyond this limit.

Citrus—fruit composition and spray residues.

(*See also* 3241g, 3250, 3251.)

3213. Pomarola, H.
Casier des agrumes de Tunisie. Campagnes 1951 à 1954. (**Data on [juice composition of] Tunisian citrus. Seasons 1951/54.)**
Fruits et Prim., 1954, **24**: 551-68.

Analytical data are presented for the juice of Washington Navel, Thomson Navel, Valencia Late and Malta oranges, mandarins, clementines and grapefruit for 1951/54. The juice % and, where applicable, the maturity index and Brix value accepted for marketable oranges, clementines, mandarins and grapefruit in France and Tunisia are quoted.

3214. Hall, E. G.
Juice of oranges.
Food Pres. Quart., 1955, **15**: 12-14, bibl. 2.

Juice from the inner and outer pulp of Valencia oranges was expressed and analysed separately. The outer juice was lower in acidity than the inner juice in all cases and higher in soluble solids in most cases. Minimum sugar content and maximum acidity occurred inwards from the stem region, while maximum sugar content and minimum acidity occurred in the outer pulp at the stylar end. There was a similar but smaller variation in lemons.

3215. Rouse, A. H., and Atkins, C. D.
Lemon and lime pectinesterase and pectin.
Proc. Fla St. hort. Soc. for 1954, pp. 203-6, bibl. 8.

Pectinesterase activity and total pectins were determined for the peel, rag, juice sacs, seeds and juice of Villafranca lemons and Persian limes.

3216. Erickson, L. C.
2,4-D residues.
Calif. Citrogr., 1955, **40**: 233.

The 2,4-D residues on lemons treated in the packing house averaged 2·2 p.p.m. when the 2,4-D had been applied in water wax, and 2·8 p.p.m. when it had been applied without water wax. These residues were within the prescribed tolerance of 5 p.p.m.

3217. Gunther, F. A., and Jeppson, L. R.
Residues of p-chlorophenyl-p-chlorobenzenesulfonate (Compound K-6451) on and in lemons and oranges.
J. econ. Ent., 1954, **47**: 1027-32, bibl. 6.

The largest portion of the residues of the acaricide p-chlorophenyl-p-chlorobenzenesulfonate on and in mature oranges and lemons at any time shortly after application is subcuticular, and thus is not available for removal by usual packing-house treatments. Apparently, little if any of the acaricide penetrates the juice of either fruit. The half-life value for this acaricide in citrus peel is approximately 10 days. Details of the analytical method utilized in determination of residues are presented and discussed. [Authors' summary.]–Calif. Citrus Exp. Stat., Riverside.

3218. Gunther, F. A., Barkley, J. H., and Ewart, W. H.
Harvest residues of apparent dieldrin in peel and juice of navel oranges.
J. econ. Ent., 1954, **47**: 1033-5, bibl. 5.

Comparisons among the analyses of treated and untreated fruit demonstrate that dieldrin was not present in measurable amounts in the peel or pulp of the fruit from plots treated in May when the fruit was only "pea size". With plots receiving treatments in May and August, an average of 0·08 p.p.m. of apparent dieldrin was found in the peel and less than 0·01 p.p.m. in the juice. [From authors' conclusions.]—The analytical method used is described.—Calif. Citrus Exp. Stat., Riverside.

Citrus—packing and storage.

(*See also* 3241r, z.)

3219. Smith, R. J., and Fulton, R. E., Jr.
Volume fill from standard orange sizers.
Calif. Citrogr., 1955, **40**: 193-5, illus., and *Citrus Leaves*, 1955, **35** (3): 10-11, illus.

The "volume fill" method of packing citrus fruit in cartons [see *H.A.*, 23: 1183] has now been widely adopted in California for lemons. Progress with oranges has been much slower. Among the reasons for this has been the difficulty in converting existing sizing machines to deliver fruit direct to the cartons. The present paper describes how one such machine has been successfully converted and discusses organization and estimated costs.

3220. Soost, R. K., and Cameron, J. W.
Behavior of the Kara mandarin under various storage conditions.
Calif. Citrogr., 1955, **40**: 163, 196-7, bibl. 4.

Tests in 1953 and 1954 showed that Kara mandarin could be stored in good condition for at least 3 weeks. At 43° F. the amount of decay was lower, and the physical characters of the fruit slightly better, than at 53° F. At both temperatures the physical condition of fruits stored in polyethylene bags and individual pliofilm wraps was much superior to that of fruits stored in cardboard cartons, but the latter were preferred in taste tests. Decay, though low in all samples, was more pronounced in fruit stored in film bags than in fruit stored in individual film wraps or in cartons. Diphenyl used in cartons led to some tainting. The method of storage had little effect on composition.

3221. Mehanik, F. Ja.
The buffer capacity of the juice as an indicator of [disease] resistance of citrus fruits during storage. [Russian.]
Bot. Žurnal, 1954, **39**: 566-8, bibl. 4.

Evidence is presented indicating that the buffer capacity of the juice of stored citrus fruits increases at first, but later, when the resistance of the fruits to storage rots decreases, it drops. The period of increase and subsequent decrease in buffer capacity was found to vary with species and variety; reduction was first noted in Unshiu mandarins, then in Hamlin and last in Washington Navel oranges. In the Unshiu mandarins a reduction in the buffer capacity was observed 10–12 days before severe storage losses occurred.

3222. Hopkins, E. F., and Loucks, K. W.
Cooling fruit after Dowicide A—hexamine treatment gives better decay control.
Citrus Mag., 1955, **17** (8): 9-12, 33, bibl. 3.

Hamlin, Parson Brown, Pineapple and Valencia oranges were used in extensive storage tests during 6 fruit seasons. Fruits were dipped in, or flooded at 90° F. with, a solution of 2% Dowicide A, 1% hexamine and 0·4% sodium hydroxide. Both treated and untreated fruits were kept at storage temperatures of 60° F. or 70° F. for 3 weeks. Losses from stem end rot and blue and green moulds were markedly reduced in treated fruit stored at 60° F., being 89% less than those of untreated lots held at 70° F., and 56% less than those of treated lots held at 70° F.—Fla Citrus Exp. Stat., Lake Alfred.

3223. Roistacher, C. N., Eaks, I. L., and Klotz, L. J.
Ammonia gas to control blue-green mold decay of citrus fruits.
Plant Dis. Reptr, 1955, **39**: 202-5, bibl. 4, illus.

In tests with injured-inoculated citrus fruit treatment with 5,000 p.p.m. gaseous ammonia twice daily for 3 consecutive days during degreening gave adequate protection against blue mould (*Penicillium italicum*) and green mould (*P. digitatum*), even when inoculation had occurred 24 to 30 hours previous to the first ammonia treatment, and an incubation temperature favourable for decay had been maintained during that period.—Univ. Calif., Riverside.

3224. Mustard, M. J.
Oleocellosis or rind-oil spot on Persian limes.
Proc. Fla St. hort. Soc. for 1954, pp. 224-6, bibl. 2, illus.

Persian limes were found to be most susceptible to rind-oil spot during rainy seasons. In general, significantly more limes developed rind-oil spot when harvested while still wet with dew than when allowed to dry before picking.

Dates.

(*See also* 3241q.)

3225. Nada, I. A. A.
Heterogeneity of date fruits.
Nature, 1955, **175**: 469-70.

A population of date fruits picked from the same palm at the same time was put into a vessel containing distilled water. The floating fruits were collected as one batch, after which the sunken fruits were placed in aqueous solutions of 2, 4, 6, 8 and 10% pure NaCl. In each case the floating fruits were collected and analysed, as was the last batch which sank in the 10% NaCl solution. The analytical data show that specific gravity was correlated with sugar content. Fruits that floated in distilled water contained 11·17 g. total sugars/100 g. fresh weight, of which 5·03 g. was sucrose, as compared with a content of 24·02 g. total sugars and 17·75 g. sucrose in fruits that sank in 10% NaCl. It is suggested that by this method of preparing homogeneous date samples the sampling error may be minimized and the number of replicates reduced.—Ain Shams Univ., Cairo.

3226. Nada, I. A. A., and Hassan, H. M.
Effect of sodium chloride on softening and carbohydrate changes of date fruits.
Nature, 1955, **175**: 735-6, bibl. 1.

Sterilized dates were soaked for 6 hours in distilled water or 2, 5 or 10% sodium chloride solutions and then placed in a well-aerated dark chamber at 30° C. for 60 hours. Those treated with 5 and 10% solutions became completely soft. Distilled water treatment caused a decrease in sucrose with a more or less corresponding increase in reducing sugars. Sodium chloride treatment accelerated the disappearance of sucrose and the accumulation of reducing sugars, especially at the 5 and 10% concentrations, which also caused slight reductions in the polysaccharide content. —Ain Shams Univ., Cairo.

Litchis.

(*See also* 3162, 3241a, 3384.)

3227. Nelson, R. O.
Notes on lychee grafting.
Proc. Fla St. hort. Soc. for 1954, pp. 231-3, bibl. 11, illus.

Budding and grafting trials using chip buds, shield buds and veneer grafts have given successful "takes". The scion wood used was selected from vigorous flushes of terminal wood, which still retained some green colour and had prominent axillary buds. The grafts were wrapped with vinyl plastic film.

Olives.

(*See also* 3241c, e, n, 3407.)

3228. Morettini, A.
Mutazione gemmarie nell'olivo e loro applicazione per il miglioramento della coltura. (**Bud mutations in the olive and their use in the improvement of yields.**)
Ital. agric., 1955, **92**: 197-204, bibl. 6, illus.

Unusually narrow leaves were observed in certain branches of Moraiolo and Frantoio olive trees. Investigation led to the conclusion that the abnormalities were due to bud mutations.

3229. Francesconi, F.
L'olivo e i mezzi di resistenza al freddo. (**Frost resistance in the olive.**) [English summary 12 lines.]
Ann. Sper. agrar., 1955, **9**: 301-19, bibl. 51, illus.

Frost injuries in the olive are discussed with particular reference to those observed at Perugia in recent years. The tree's resistance to frost depends on 6 factors: (1) the presence of thick-walled cell tissue; (2) the absence of irregularities in the bark of the shoots into which water could penetrate; (3) moisture reduction; (4) an increase in soluble sugars in the leaf; (5) the changing of insoluble salts into soluble and therefore osmotically active compounds; and (6) the reduction to almost nothing of the angle between leaf and shoot which normally ranges from 30° to 80°. The concentration of sugars is higher in colder weather. Frost resistance varies from tree to tree and is a clonal character that might well be taken into consideration in selecting material for propagation.—Ist. Colt. arb. Univ. Perugia.

3230. Anagnostopoulos, P. T.
Control of *Dacus oleae*. [Greek, with English summary 1¼ pp.]
[*Publ.*] *Acad. Athens*, 1955, pp. 32, bibl. 19.

In Greece the olive fly has 3 annual generations. Hymenopterous parasites effectively control the first 2 but not the third (the autumn) generation which periodically causes serious damage. The Berlese method of control is not successful in Greece and parathion has a number of disadvantages which are enumerated. The author favours biological control but proposes to continue limited experiments in chemical control. The larval and pupal parasite, *Opius longicaudatus*, was introduced from Hawaii in 1954 in an attempt to control the autumn generation.

3231. Ayoutantis, A. J., and others.
Rapport sur les travaux expérimentaux de lutte contre le dacus à l'aide de parathion à Roviès (Eubee) pendant l'annee 1953. (**Report on experimental work on olive fly control at Roviès (Eubœa, Greece) in 1953.**)
Ann. Inst. phytopath. Benaki, 1954, **8**: 5-75, bibl. 20.

An application of parathion emulsion (0·015% and 0·03%) in summer to olives checked the development of *Dacus oleae* larvae, except those in the third stage, and prevented oviposition for 20 days. 0·1% parathion emulsion applied on 12 September killed all larvae, except those in the third stage, and prevented the hatching of eggs for the rest of the season. At harvest the parathion residue in fruit and oil did not reach the tolerance limit of 3 p.p.m. In the case of a heavy infestation of olive fly occurring in summer a parathion dosage of 0·025% is recommended as the immediate answer, to be followed by a 0·1% parathion treatment in September. Some premature fruit drop after 15 October was found to be due to *Dacus oleae*, but fruit drop up to the end of September must be attributed to the moth *Prays oleellus*. The biology of the olive fly is also discussed.

3232. Russo, G., and Santoro, R.
Esperimenti di lotta antidacica eseguiti in Ascea (Salerno) nel 1953. (**Experiments on the control of the olive fly in Ascea (Salerno) in 1953.**) [English summary 1¼ pp.]
Ann. Sper. agrar., 1955, **9**: 349-81.

The methods of control tested and the results obtained were: (1) The Berlese poison bait method delayed summer infestation but had no effect in the autumn; (2) the Russo method, whereby the tree is sprayed with clay plus adhesive in water, gave protection until rain washed off the protective coating; (3) DDT emulsifiable paste sprayed on 4 times in July/October gave good results; (4) dieldrin gave moderately good results; (5) malathion had no effect; (6) parathion applied thrice as a spray or dust at the period of greatest fly activity in October/early November prevented the normal heavy attacks, killing both eggs and larvae, and resulted in a high percentage of clean fruit; (7) systemics applied as cover sprays showed no systemic action but only a penetrative action like that of parathion; (8) soil application of the systemic Dimefox gave no results; (9) combined treatments, including autumn parathion, gave results similar to those of autumn parathion alone.—Lab. Ent. agrar. Filippo Silvestri, Portici.

3233. Bellod, M. B.
Empleo de los insecticidas orgánicos de sintesis en la lucha contra *Liothrips oleae* Costa. (**Use of synthetic organic insecticides against *Liothrips oleae*.**)
Commun. sci. IIIe Congr. int. Phytopharm., 1952, Vol. II, being *Phytiatrie-Phytopharm.*, Num, spéc. 1954, pp. 210-15.

In tests in the Jaen province of Spain on *Liothrips oleae* 0·05–0·15% DDT emulsion gave over 99% control, 0·2–0·3% terpene emulsion 96–99% and 0·024% lindane 98%, compared with HCN fumigation (the normal practice) 99%.—Dir. gen. Agric., Madrid.

3234. Rousseau, A., and Pavlides, —.
Note sur un procédé de la détermination de la qualité des olives à huile. (**Note on a method of assessing quality in oil olives.**)
Fruits et Prim., 1954, **24**: 547-9.

A simple, rapid and accurate method of assessing quality in oil olives has been developed at the Colonial School of Agriculture, Tunis. It is based partly on the condition of the fruit and partly on its acidity, which increases with storage. The fruit is graded into 4 classes according to condition, class B, for example, being fresh, very ripe, more or less bruised fruit. The acidity of the oil, extracted from a small sample of fruits by one of three methods, is then determined by titration.

3235. Rousseau, P. M.
La procédé Drupex et l'extraction de l'huile d'olive. (**The Drupex process and the extraction of olive oil.**)
Oléagineux, 1955, **10**: 183-8, and *Tunis. agric.*, 1955, **56**: 37-45.

In tests in Tunisia the use of Drupex powder, which raises the pH of the pulp, increased the oil extracted by an average of about 1·5%. The process facilitates smooth working of the presses, reduces wear and labour costs and has no detrimental effect on the quality of the oil.

Passion fruit.

3236. Yee, W.
Hints on passion fruit culture.
Hawaii Fm Sci., 1955, **3** (3): 2.

Trials are in progress with passion fruit selections, which are being grown under differing conditions in the Islands of Hawaii, Molokai, and Kauai. In one area, where the annual rainfall is 145 in., the vines have grown very well, and fruit was harvested 7 months after planting. Fruits have tended to be larger under high rainfall conditions than in low rainfall areas. Passion fruits have adapted themselves to many soil types; the poorest growth was observed on potentially fertile magnesium clays.

3237. Pruthi, J. S., and Lal, G.
Germination trials in passion fruit seeds (*Passiflora edulis* Sims).
Indian J. Hort., 1954, **11**: 138-44, bibl. 12, illus.

The germination of fresh seeds started within 12–15 days of sowing and was completed within another fortnight, by which time 70–95% had grown. The percentage germination for 1-year-old seed, after storage at room temperature was 23–36%, and the rate of germination was much slower than that of fresh seed. Overnight soaking in hot water at an initial temperature of 180° F. did not help the percentage or rate of germination.—Cent. Food tech. Res. Inst., Mysore.

Tung.

3238. Nyasaland.
Tung.
A.R. Nyasaland Dep. Agric. 1953/54, Part II, 1955, pp. 22-8.

Buddings vs. *seedlings.* In this experiment, planted in 1940, buddings on *montana* again gave higher yields than those on *fordii* or than selected and unselected seedlings, but, for the first time, the difference between *montana* and *fordii* was not significant, due perhaps to the greater drought-resistance of the latter. *Clonal trials.* From 2 trials planted 15 years ago it appears that the A-types are not going to outyield the vigorous B-types. *Inter-cropping and cover cropping.* The results of the experiment planted in 1948 were the same as last year [*H.A.*, 24: 3094]. *Fertilizer trials.* Interim results are given. *Biennial bearing.* In 1954, an on-year and the first year of the experiment, less lateral growth was made by the controls than by trees treated as follows: (1) double N at the beginning of the rains in the on-year and none at the beginning of the off-year; (2) removal of half the flower buds per tree at the beginning of the growing season in the on-year; and (3) a combination of (1) and (2).

3239. Drosdoff, M.
Role of leaf analysis in fertilization of tung trees.
Plant Analysis and Fertilizer Problems, [1955], pp. 181-90, bibl. 24, I.R.H.O. Paris, being part of *Proc. 8th int. bot. Congr. 1954.*

Leaf analyses have been helpful in the diagnosis of mineral deficiencies with and without symptoms, in the prediction of fertilizer needs from yearly trends, and in correlations with soil analysis. Any quantitative fertilizer recommendations, however, cannot be based on leaf analysis alone. The usefulness of leaf analysis data will be increased when more information on biochemical relations within the plant becomes available.—Hort. Crops Branch, Agric. Res. Serv., U.S. Dep. Agric.

3240. Jezek, R. E., Kilby, W. W., and Jones, E.
Tung harvester developed through research.
Miss. Fm Res., 1955, **18** (3): 1, 8, illus.

A tung harvester which picks the fruit up from the ground on to a conveyer belt has given satisfactory results in commercial tests. The fruit is swept into windrows by spiral brushes mounted on front of a small 4-wheel tractor. The harvester, attached to the rear of the tractor, picks up the fruit, blows off the dirt, leaves, etc., with a fan, and transfers the fruit to a trailer. Fruit lying in the tree rows has to be raked into the alleys by hand. For satisfactory performance of the machine the land should be smoothed over in August or September.

Noted.

3241.

a Ahmad, S.
Cultivation of lychee (*Litchi chinensis*) in the Punjab.
Punjab Fruit J., 1954, **18** (68/69): 45-6.

b Bitters, W. P.
Citrus variety collections at Riverside.
Calif. Citrogr., 1955, **40**: 162, 176-8, illus.
Notes on a very large collection of citrus species, varieties and relatives.

c Buchmann, E.
L'olivier irrigué. **(The irrigated olive tree.)**
Tunis. agric., 1955, **56**: 65-80, illus.
An account of a large-scale irrigation project started in 1950.

d Caprio, J. M., and Harding, R. B.
Orange fruit size and yield.
Calif. Agric., 1955, **9** (5): 11-12.
See *H.A.*, 25: 2018.

e Coupin, A.
L'olivier dans la zone pluvieuse: terrain—multiplication—plantation—formation. **(The olive tree in the rainy zone: sites, propagation, planting and training.)**
Tunis. agric., 1955, **56**: 49-61.

f Coveney, R. D., and Pickering, G. B.
Limonene from Jamaica.
Colon. Plant Anim. Prod., 1954, **4**: 319-20.
From orange oil; a favourable report.

g Crescimanno, F. G., and Sacco, S.
Ricerche su alcune cultivar siciliane di limone. Variazioni e significato biologico del contenuto in acidità totale, in acido citrico ed in zuccheri riduttori durante la maturazione dei frutti. **(Research on some Sicilian varieties of lemon. Variations and biological significance of contents of total acids, citric acid and reducing sugars during fruit ripening.)** [English and French summaries 8 and 10 lines.]
Riv. Ortoflorofruttic. ital., 1955, **39**: 137-47, bibl. 25, illus.
The varieties were the common Femminello and the new Lo Porto.

h Enikeff, M.
L'économie et la localisation de l'azote dans le sol d'une plantation d'orangers dans le Haouz de Marrakech. **(Content and distribution of nitrogen in the soil in an orange plantation in the Haouz de Marrakesh.)**
Fruits et Prim., 1954, **24**: 527-31.

i Gentile, G.
Panorama agrumicolo di Napoli e Caserta. **(Citrus growing in Naples and Caserta.)**
Riv. Ortoflorofruttic. ital., 1955, **39**: 188-95, illus.
Localities, acreage, varieties, marketing and economics.

j Hamilton, R. A., and Beaumont, J. H.
Fertilizing a bearing macadamia orchard.
Hawaii Fm Sci., 1955, **3** (3): 6.
Recommendations based mainly on observation.

k Harding, R. B., Chapman, H. D., and Whiting, F. L.
Small fruit sizes of Valencias.
Calif. Agric., 1955, **9** (4): 6, 13.
For a more detailed account see *H.A.*, 24: 757.

l Hoos, S.
Prices and marketing margins.
Calif. Agric., 1955, **9** (3): 3-4 and **9** (4): 2, 14.
Basis on which retailers price fresh oranges, lemons and grapefruit.

m Jacopini, P.
Un arbusto fruttifero per i nostri giardini. **(A fruit-bearing shrub for our gardens.)**
Riv. Ortoflorofruttic. ital., 1955, **39**: 77-81, illus.
Feijoa sellowiana; varieties recommended for Italy.

n Jannone, G.
Lotta contro tre parassiti dell'olivo in Liguria con sistema ad azione polivalente. **(Combined control of three olive parasites in Liguria.)**
Humus, 1954, **10** (11): 20-2, illus.
Suggestions for dealing with *Liothrips oleae*, *Prays oleellus* and *Cycloconium oleaginum*.

o Khan, M.-u-D., and Haq, I.
Nomenclature of citrus species in the Punjab.
Punjab Fruit J., 1954, **18** (68/69): 41-5, bibl. 14.
Descriptions of 10 types belonging to 6 species.

p Kolelišvili, M. V.
Selection of hybrid lemon seedlings. [Russian.]
Agrobiologija, 1955, No. 1, pp. 55-63, illus.
At Suhumi, for frost resistance.

q Nutini, G.
La palma da dattero in Migiurtinia. **(The date palm in Migiurtinia.)** [English summary 2 lines.]
Riv. Agric. subtrop., 1955, **49**: 67-77.
In Italian Somaliland.

r Perry, R. L.
Mechanization progress in fruit handling.
Calif. Citrogr., 1955, **40**: 243-5.
Including observations on bulk-handling citrus and cooling oranges for carton shipment.

s Renaud, M.
Le clémentinier dans le département de Constantine. **(The clementine orange tree in the Constantine district of Algeria.)**
Fruits et Prim., 1954, **24**: 415-18, illus.
Where it yields particularly well without ringing, etc.

t Sweet, R. H.
Official method for the determination of oil in avocados. (Revised 1954.)
Bull. Calif. Dep. Agric., 1955, **44**: 37-41, bibl. 3, illus.

u Tanaka, T.
Botanical and horticultural aspects of Asiatic citriculture.
Citrus Leaves, 1955, **35** (3): 12, 20, 32, and **35** (5): 13, 18, 28-9, bibl. 7, illus.
History, etymology, botany and distribution of species in India and the Far East.

v Tidbury, G. E.
A citrus industry for Zanzibar.
World Crops, 1955, **7**: 184-6, illus.

w Ullah, H.
Some aspects of layout of a commercial fruit garden in the Punjab.
Punjab Fruit J., 1954, **18** (68/69): 1-6.

x Ullah, H., and Ali, S.
Economics of fruit gardening in the Punjab (Pakistan).
Punjab Fruit J., 1954, **18** (68/69): 18-24.

y Ward, W. B.
The papaw and persimmon in Indiana.
45th A.R. north. Nut Grs' Ass. 1954, Lancaster, Pa, pp. 59-62.
The papaw referred to is *Asimina triloba* (Anonaceae) and the persimmon, *Diospyros virginiana*.

z Wason, A. B.
Air-conditioned storage in the citrus industry.
Citrus Leaves, 1955, **35** (2): 6-8, 22, 33, illus.
A general account of requirements and operations.

TROPICAL FRUIT AND PLANTATION CROPS.

General.

(*See also* 2423, 2455, 2536, 2768-2775, 3369b, k, l, x, z, 3370h, l, 3386, 3400, 3408a-d, f, h-j, m, q.)

3242. Commonwealth Economic Committee.
Plantation Crops.
[*Publ.*] *Commonw. econ. Cttee*, 1955, pp. 146, H.M. Stationery Office, Lond., 5s.

The scope of the publication is indicated by its sub-title: "A review of production, trade and consumption relating to sugar, tea, coffee, cocoa, spices, tobacco and rubber". Data are tabulated for each of the years 1948–53 in comparison with the last years of the pre-war period. For notes on the arrangement of this annual review see *H.A.*, 21: 2149.

3243. International Labour Organization.
Committee on work on plantations. First session, Bandoeng, 1950. Basic problems of plantation labour.
Ibid. Second session, Havana, 1953. Report I—General report; and ***Report I, Item 1 (a) and (b) Effect given to the conclusions of the first session. Report II—Definition of the term plantation. Report III—Regulation of wages on plantations. Report IV—Health and social services on plantations.***
I.L.O., Geneva, 1950, pp. 166, and 1953, pp. 103, 193, 36, 106 and 123.

Report I—General Report discusses, among other things, the basic trends in the economics of coffee, tea, sugar and rubber, and the extent of cultivation of cacao, bananas, tobacco, sisal, abaca, henequen and other crops. *Report II* gives an account of progress made towards a generally acceptable definition of the word "plantation".

3244. Gerlach, J. C.
Developing agriculture in New Zealand's island territories.
N.Z. J. Agric., 1955, **90**: 2-10, illus.

In 1952 the New Zealand Government established a tropical section of the Department of Agriculture to advise on agricultural problems in Western Samoa, the Cook Islands, Niue and the Tokelan Islands. The main export crops are coconuts, cacao, citrus, sweet potatoes, tomatoes and bananas. The author discusses the existing pattern of agriculture and the difficulties to be overcome in expanding production in these territories.

3245. Garrard, A.
The germination and longevity of seeds in an equatorial climate.
Gdns' Bull. Singapore, 1955, **14**: 534-45, bibl. 7.

The percentage germination of seeds of 28 locally grown species was determined immediately after collection and after storage in tightly stoppered glass tubes at monthly intervals up to 10 months. The high humidity and relatively high temperature conditions were unfavourable to seed storage. Only seeds of *Asclepias curassavica*, *Adenanthera pavonina*, *Quamoclit pinnata*, *Ricinus communis*, *Spathodea campanulata* and *Urena lobata* remained viable for over 9 months. The permeability of seeds of *Adenanthera pavonina* decreased under storage in air, but seed viability did not decrease. Untreated *Adenanthera* seed was often slow to germinate, sometimes taking more than a year, though scarified seed all germinated within 4 days.—Univ. Malaya.

3246. Laudelout, H.
Le diagnostic du besoin en engrais par l'analyse foliaire. (**The determination of fertilizer requirements by leaf analysis.**)
Bull. Inf. INEAC, 1955, 4: 89-94, bibl. 4.

Oil palm. Average leaf contents of N, P, K, Ca and Mg found at Yangambi are compared with the critical levels of these elements as determined in French Equatorial Africa. *Citrus.* Leaf contents of N, P, K, Ca and Mg found at Mvuazi are compared with those recorded in other countries. *Sisal.* The requirements for healthy sisal at Gimbi are 1·1% leaf K and 0·2% soil K to 20 cm. depth. *Robusta coffee.* The properties and composition of two soils under, and the leaf analyses of, healthy and chlorotic coffee are given. The 2 soils had similar mineral contents but differences in C and N resulted in a slightly lower base exchange capacity in the soil under the chlorotic coffee and this led to poorer NP nutrition.

3247. Pandalai, K. M., Sankarasubramoney, H., and Menon, K. P. V.
Nutrient contents of some green manure plants commonly used in coconut soils.
Indian Coconut J., 1954, **8**: 32-40, bibl. 11.

The macro- and micro-nutrient contents of 8 green manure species—4 *Crotalaria* spp., *Pueraria javanica*, *Calopogonium mucunoides*, *Tephrosia candida* and *Glyricidia maculata*—are given. Bulk for bulk the green manures compare well with farmyard manure. *Crotalaria striata* or *Glyricidia maculata* are recommended for coastal coconut plantations.—Cent. Coconut Res. Stat., Kayangulam.

3248. Rubber Research Institute of Malaya.
Further legume covers.
Plant. Bull. R.R.I.M., 1955, No. 17, pp. 31-8, illus.

The minor cover crop and other leguminous plants briefly described are *Mimosa invisa* var. *inermis*, *Aeschyomene indica*, *A. americana*, *Clitoria laurifolia* *C. ternatea*, *Tephrosia vogelii*, *Stylosanthes gracilis*, *S. sundaica* and *Desmodium ovalifolium.*

3249. Floch, H., and Gélard, A.
Valeur alimentaire de produits guyanais. (**The food value of French Guiana crops.**)
Publ. Arch. Inst. Pasteur Guyane franç. **335**, 1954, pp. 7, bibl. 4.

Fruits and vegetables on which analytical data are presented include cucumber, plantain, asparagus, *Basella cordifolia*, pumpkin, *Canavalia obtusifolia*, jackfruit, breadfruit and coconut.

3250. Floch, H., and Gélard, A.
Dosage de l'acide ascorbique dans des fruits guyanais. (**The ascorbic acid content of French Guiana fruits.**)
Publ. Arch. Inst. Pasteur Guyane franç. **337**, 1954, pp. 6, bibl. 11.

The ascorbic acid contents of lemon, watermelon, pineapple, *Chrysobalanus icaco*, banana, sapodilla, guava and *Malpighia punicifolia* are given. The last two have the highest contents, namely 272 and 1,326 mg./100 g.

3251. Pruthi, J. S., Tandon, G. L., and Lal, G.
Pilot-plant studies on the processing of some important tropical fruits and their economic feasibility.
S. Indian Hort., 1955, **3**: 10-15, bibl. 4.

The results of pilot-plant trials conducted during the last 3 years on canning and making squash from pineapples, mangoes, oranges and jackfruit are discussed with reference to methods, testing and production costs.—Cent. Food tech. Res. Inst., Mysore.

Bananas.

(*See also* 3369g, q, 3370i, p.)

3252. Cardeñosa-Barriga, R.
El género *Musa* en Colombia: platanos, bananos y afines. **(The genus *Musa* in Colombia: plantains, bananas and their relatives.)**
Not. agron. Palmira, 1953, **6**: i-xix, 1-373, bibl. 868, illus.

The chapter headings are: notes on the genus, morphological and anatomical descriptions, cytogenetics, physiology, chemical composition and food value, diseases and pests, taxonomy of the family and of the section Eumusa, and description of the species and varieties. Nearly half the paper (179 pp.) is devoted to a copiously illustrated description of the 21 plantain and banana varieties represented in the collection at the Palmira Agricultural Research Station. Of these varieties 6 belong to *Musa paradisiaca*, 2 to *M. banksii*, 4 to *M. balbisiana*, 1 to *M. maoli* Cardeñosa n. sp., 2 to *M. acuminata*, 5 to *M. sapientum* and 1 to *M. cavendishii*. The following information about the varieties described is given in the appendices: (1) number, size, individual and total weights of fruit; (2) susceptibility to rayadilla and cercospora leaf spot diseases; (3) number of days from planting to flowering, to fruit maturation and to maturation of the first ratoon bunch.

3253. Bazán de Segura, C.
Problemas fitopatológicos actuales del cultivo del platano en Tumbes. **(Current disease problems in banana plantations in the Tumbes valley [Peru].)** [English summary 2 pp.]
Inf. Estac. exp. agric. La Molina **92,** 1954, pp. 18.

Notes are given on banana varieties, acreage cultivated and diseases, including the symptoms and control of a fatal disorder of Gros Michel due to waterlogged soil conditions.

3254. Guyot, H., and Cuillé, J.
Les traitements fongicides des bananeraies. II. Efficacités des differents modes de traitements. Rôle de l'huile. **(The fungicidal treatment of banana plantations. II. Efficacy of different methods of treatment. The role of oil.)**
Fruits d'Outre Mer, 1955, **10**: 101-7, bibl. 3, illus.

A description is given of a series of experiments made at the I.F.A.C. Antilles Station in 1953/55 on the role of oil in the control of cercospora leaf spot. (1) One kg. zineb plus 9 l. light oil plus 3 l. gas oil was more efficacious when applied as a mist (60–70μ particle size and 25 l. per ha.) with a Minimicron atomizer than when applied as a fog (35μ at 25 l.) with Swingfog apparatus, the yields per plant being 15·7 and 14·6 kg. respectively compared with 10·5 in the control. (2) Oil misting as above but without zineb gave much better control than 40 kg. 10% zineb dust per ha., viz. 85% compared with less than 60% healthy leaves at the end of the season. (3) Misting and fogging as above, with and without added zineb, are being compared in a current experiment. (4) In a plantation treated in the first year with zineb in water and in the second with an oil mist the respective mean bunch weights were 11·0 and 16·1 kg. [For Part I, see *H.A.*, 25: 995.]

3255. Tollenaar, D.
The control of sigatoka (banana leaf spot disease) by mist-blowing with Banacobre-Sandoz.
Neth. J. agric. Sci., 1955, **3**: 70-83, bibl. 14, illus.

In Ecuador a special mist blower was constructed with a pipe 8½ m. high, at the top of which were 6 downward-pointing outlets. A 3% solution of Banacobre-Sandoz (a cuprous oxide with a sticker) was blown down on the upper leaf surfaces of banana rows on each side. The droplet size was 50–100μ. Satisfactory control of banana leaf spot was obtained by using 100 l. spray per ha., in regular 3- or 4-weekly cycles from the beginning of January. Fruit washing was not necessary after using this spray.

3256. Lulla, B. S., and Johar, D. S.
Chromatographic analysis of sugars in banana.
Curr. Sci., 1955, **24**: 92-3, bibl. 7.

The ripe fruits of 8 varieties (*Musa sapientum*, *M. cavendishii* and *M. balbisiana*) contained 7–8 sugars, 4 of which correspond to the positions of maltose, sucrose, glucose and fructose, 3 are near rhamnose and one (unidentified) is below maltose. In unripe fruit sucrose, glucose and fructose were generally present, but in one cooking variety glucose was the only sugar present.—Centr. Food Tech. Res. Inst., Mysore.

Cacao.

(*See also* 3369c, s, 3370q, t, 3398, 3406.)

3257. U.S. Department of Agriculture, Foreign Agricultural Service.
Cocoa. World situation report.
Foreign Agric. Circ. **FCB-C-2-55**, 1955, pp. 27.

Cocoa prices reached unprecedented levels in 1954. Price trends from July, 1953, to February, 1955, are briefly reported. World production in 1954/55 is forecast at 1,713 million lb. compared with the low crop of 1,578 in the season before. The situation in the principal producing countries is discussed and a table gives their production figures from 1935/36 onwards.

3258. Viton, A.
Economic aspects of cocoa consumption.
FAO mon. Bull. agric. Econ. Statist., 1955, **4** (5): 1-10.

From a consideration of past consumption in relation to incomes and price the author concludes that decline in the "real" price from that of 43 cents prevailing in 1953-54 to, say, 25–30 cents—which would still give growers a remunerative return on their investment and labour, assuming no export or other duties—would result in a rise in consumption demand of 75,000 to 95,000 tons. Considering the potential increase of 85,000 tons in consumption demand by 1960 as a result of population and income growth, it would appear that at a "real" price of 25–30 cents a pound the world could then absorb 160,000 to 180,000 tons more than at present.

3259. Moll, E. R.
A guide to cocoa rehabilitation under the Cocoa Subsidy Scheme.
de Verteuil, L. L.
Notes on the field establishment of clonal cocoa.
[*Publ.*] *Cocoa Bd Trin. Tob.*, 1954, pp. 39, illus.

The Cocoa Subsidy Scheme has as its objects the provision of free clonal planting material and a cash subsidy for replanting land suited to continued cacao growing, as well as financial aid for establishing mixed farming in the form of alternative crops to cacao and the purchase of livestock. This booklet describes the scheme under the following headings: general outline and rules, rehabilitation with clonal cacao, manuring subsidy, estate propagators, and the replacing of cacao by alternative crops, and, in a separate part (pp. 33-9), gives advice on planting, ground shade, permanent overhead shade, cultivation, pruning and fertilizing.

3260. Gordon, J.
Uniformity trial on Gold Coast cacao. (A note.)
Emp. J. exp. Agric., 1954, **22**: 332, bibl. 1.

The results of a uniformity trial on 269 one-quarter acre plots suggest that 300–400 trees per acre may be a natural optimum density for the Tafo area.

3261. Knight, R., and Rogers, H. H.
Incompatibility in *Theobroma cacao*.
Heredity, 1955, **9**: 69-77, bibl. 22.

Incompatibility was studied among the progeny of 3 clones of Amazon cacao crossed in all combinations. All the progeny were found to be self-sterile but to a limited extent cross-fertile. The incompatibility system in Amazon cacao is discussed in relation to dominant gene action and the "antigen-antibody" theory of incompatibility. It is suggested that the active incompatibility substances are confined to the cytoplasm of ovules and pollen. [From authors' summary.]—W. Afr. Cacao Res. Inst., Tafo.

3262. Taylor, D. J.
A summary of the results of capsid research in the Gold Coast.
Tech. Bull. W. Afr. Cacao Res. Inst. **1,** 1954, pp. 20, bibl. 28, illus., 2s. 6d.

The species involved are *Distantiella theobroma*, *Sahlbergella singularis*, *Helopeltis bergrothi* and *Bryocoropsis laticollis*, the two last being of slight economic importance at present. Information is given on capsid damage, the role of *Calonectria rigidiuscula*, the factors associated with damage (overhead shade and soils), life histories and bionomics of *D. theobroma* and *S. singularis*, alternative hosts, capsid populations, and ecological factors affecting the populations (moisture, temperature, light and biotic factors). *Control.* Cultural: mature damaged cacao can be regenerated by coppicing to 4–6 in. and subsequently treating the chupons with DDT. Biological: results so far have shown little promise. Chemical: at present the best method is DDT dusting. A light-weight dusting machine convenient for use on cacao farms has been developed. Smokes are unsatisfactory. Current spraying research is discussed.

3263. Nicol, J., and Taylor, D. J.
Capsids and capsid control in the Belgian Congo with particular reference to Lukolela Plantations.
Tech. Bull. W. Afr. Cacao Res. Inst. **2,** 1954, pp. 10, bibl. 7, illus., 1s.

The capsids found on cacao in the Congo are *Sahlbergella singularis*, *Helopeltis* spp. including *H. bergrothi*, and *Bryocoropsis coterrelli.* At Lukolela and elsewhere harvesting and hygiene including capsid control are integrated. Each labourer harvests his own individual block from Monday to Wednesday and then forms part of a hygiene team operating in 20–25 adjacent blocks from Thursday to Saturday. Each team includes 2–3 men with hand-operated rotary-fan or bellows dusters who give localized treatment to trees on which recent capsid damage has been found. Every part of the plantation is covered at fortnightly (or monthly) intervals throughout the year. The dust contains 2·2% BHC gamma isomer and, in the case of fortnightly treatment, is used at the rate of about ½ lb. per acre per month. The success of the system depends on (1) the trees being regularly spaced and the blocks being of considerable size; (2) the trees being kept low-branched to permit close inspection of all pods and branches and to facilitate hand-dusting.

3264. Dun, G. S.
Notes on cacao capsids in New Guinea.
Papua N. Guinea agric. Gaz., 1954, **8** (4): 7-11.

Capsid damage, first observed in 1949, occurs mainly on the pods and is considerable. Three species of *Parabryocoropsis* and *Pseudodoniella pacifica* are involved. BHC dust has shown promise in preliminary trials.

Coconuts.

(*See also* 3369j, n, o, 3370j, m.)

3265. Tammes, P. L. M.
Review of coconut selection in Indonesia.
[Dutch summary.]
Euphytica, 1955, **4**: 17-24, bibl. 6, illus.

The improvement of the tall type of coconut in Indonesia is based on selection of mother trees and artificial crossing of high yielders. The progeny of these crosses form the so-called primary seed gardens. After thinning, the most productive trees provide the fruits used for raising secondary seed gardens. The F_1 generation of the cross between tall and dwarf types shows a difference in flowering time of male and female flowers, early bearing and intermediate-sized nuts.

3266. Aiyadurai, S. G.
A note on the nursery studies on coconut seedlings.
Indian Coconut J., 1954, **7**: 156-63.

Conclusions drawn from investigations on coconut nursery practices in various parts of India are: (1) seed nuts should be harvested in February/May on the west coast and in March/June on the east coast; (2) seedlings of 9–12 months' old can safely be kept packed under partial shade for periods up to 10 days from lifting; (3) *Sesbania speciosa* is the best nursery shade crop; (4) for mulching nursery beds coconut leaves are the best material, followed by paddy straw.

3267. Gangolly, S. R.
Role of hormones in stepping up coconut production.
Bull. Indian centr. Coconut Cttee, 1955, **8**: 217-19, 223.

An interim account is given of studies in progress at the Central Coconut Research Station, Kasaragod, on the effect of hormone sprays in controlling undue shedding of buttons, preventing the formation of barren nuts and inducing flowering in unproductive trees.

3268. Cutter, V. M., Jr., Wilson, K. S., and Freeman, B.
Nuclear behavior and cell formation in the developing endosperm of *Cocos nucifera*.
Amer. J. Bot., 1955, **42**: 109-15, bibl. 24, illus.

After fertilization and enlargement of the coconut embryo sac the sac cavity is filled with a clear fluid in which numerous free nuclei are suspended. Later many free spherical cells develop, of variable size and nuclear complement. Next, these cells and free nuclei migrate to the sac periphery and adhere to the endothelial surface. Development of the cellular endosperm by coalescence of cells and nuclei starts at the antipodal end and continues upwards to the micropyle. Mitotic divisions become more common as cellular differentiation continues. The endosperm finally consists of columns of radially elongated cells. The basal cell layers next to the endothelium remain meristematic until relatively late in endosperm maturation.—Univ. N. Carolina, Yale Univ., and Univ. Wisconsin.

3269. Wilson, K. S., and Cutter, V. M., Jr.
Localization of acid phosphatase in the embryo sac and endosperm of *Cocos nucifera*.
Amer. J. Bot., 1955, **42**: 116-19, bibl. 7, illus.

The acid phosphatase activity of the liquid endosperm of coconut is found mainly in the non-cellular particulate material and in the cytoplasm of the free cells. During the early formation of the solid endosperm, enzyme activity is concentrated in cytoplasmic particles orientated along the organizing cell walls. There is also marked localization of enzyme activity in the nucellus and vascularized portion of the integument. As the solid endosperm increases in thickness, phosphatase activity is highest in the basal meristematic layers and lowest in cells towards the centre of the sac cavity. [From authors' summary.]—Yale Univ. and Univ. N. Carolina.

3270. Salgado, M. L. M.
The nutrient content of nut water in relation to available soil nutrients as a guide to the manuring of the coconut palm (*Cocos nucifera*).
Plant Analysis and Fertilizer Problems, [1955], pp. 217-38, bibl. 28, I.R.H.O. Paris, being part of *Proc. 8th int. bot. Congr. 1954.*

The dominant requirement of the coconut is K, which is concentrated in the pericarp and water of the nut. K_2O in the nut water can be determined by the gravimetric cobaltinitrite method. It was shown that drought markedly affected nut size and the volume of nut water, as well as its potash content. The K_2O content of nut water increased with potash applications and can provide an index of the K_2O status of the soil and of the expected yields. In a factorial NPK experiment there was little change in the Ca content of nut water under different manurial conditions. The K/Ca ratio for leaflets of 3-year-old palms varied from 3·3 to 3·8 with considerable seasonal fluctuations.—Coconut Res. Inst., Ceylon.

3271. Sankarasubramoney, H., Pandalai, K. M., and Menon, K. P. V.
Studies on soil conditions in relation to the "root" and "leaf" diseases of coconuts in Travancore-Cochin. Part I. Nitrogen, organic matter content and carbon/nitrogen ratio of coconut soils.
Indian Coconut J., 1954, **8**: 5-25, bibl. 12.

The detailed studies described failed to reveal any direct connexion between soil N, organic matter and C/N ratio and the occurrence of root and leaf diseases, the causes of which remain uncertain.—Centr. Coconut Res. Stat., Kayangulam.

3272. Nirula, K. K., and others.
Observations on the biology and control of *Contheyla rotunda* H.
Indian Coconut J., 1954, **7**: 143-55, bibl. 10, illus.

The leaf-eating caterpillar *Contheyla rotunda*, a sporadic pest of coconut on the west coast of India, occasionally causes severe defoliation and consequent loss of yield. In a field test a heavy infestation was controlled with 0·1% DDT at ⅓ gal. per palm. The biology and natural parasites of the pest are discussed.—Centr. Coconut Res. Stat., Kayangulam.

Coffee.

(*See also* 3369d, f, r, s, y, 3370e, g, 3400, 3405.)

3273. Indian Coffee Board.
Sixth Annual Report of the Research Department of the Indian Coffee Board (1952-53), 1954, pp. 91, R.1, being *Bull. Res. Dep. Indian Coffee Bd* **6.**

An account is given of research at Balehonnur and Chethalli on the following: *Botany:* Breeding, selection, vegetative propagation, training and seed germination tests of arabica and robusta, green manure crops, shade trees. *Chemistry:* Manurial experiments including catalysed manures, processing and fermentation.

Agronomy: Cultivation, mulching, weeding, manuring, pruning, topping and rooting of sucker cuttings. *Plant protection:* Stem borer (*Xylotrechus quadripes*), eelworm control, copper fungicide trials.

3274. Maistre, J.
Méthodes rationnelles d'amélioration des caféiers dits "de basse altitude". (**Practical methods of improving types of lowland coffee.**) [English and Spanish summaries 11 lines each.]
Agron. trop., 1955, **10**: 141-73, bibl. 10, illus.

The lowland coffees, *Coffea canephora* and *C. excelsa*, display polymorphism and cannot be improved by routine breeding methods. Seven practicable methods of improving them are described. These are: (1) vegetative propagation from monoclonal plantations; (2) vegetative propagation from monoclonal plantations containing good pollinators; (3) vegetative propagation from biclonal or oligoclonal seed gardens; (4) sexual reproduction from monoclonal seed gardens; (5) simple crossing in biclonal or oligoclonal seed gardens; (6) complex crossing in polyclonal seed gardens; (7) hybridization and repeated backcrossing.

3275. van der Knaap, W. P.
Blancoproeven met cacao en koffie. (**Uniformity trials with cacao and coffee.**) [English summary 1½ pp.]
Arch. Koffiecult., 1955, **17**: 187-239, bibl. 32.

The author discusses the influence of plot size and form on variability. In cacao and, to a lesser extent, in coffee the effect of block size on variability is not very great. With the experimental methods that can be applied in practice only differences in mean yield of the order of 20–30% can be distinguished. The following conclusions were drawn from uniformity trials with coffee: 1. The coefficients of variability of one planting fluctuated in a number of crop years between 53% and 78% in a grafted planting and between 61% and 154% in a seedling planting. 2. When the yields of several years were totalled, the variability coefficients of the grafts approached 50% and those of the seedlings 60%. 3. The coefficients of heterogeneity were considerably higher in the seedlings than in the grafts.—Proefstat. C.P.V.

3276. Indian Coffee Board.
Shade trees for arabica coffee.
Indian Coffee, 1955, **19**: 37-43, illus.

An annotated list is given of the shade trees used for coffee in different parts of South India. The 2 principal species are *Erythrina lithosperma* and *Grevillea robusta*. *Ficus glomerata* is common in some places.

3277. Mendes, H. C., and Franco, C. M.
Nota sôbre a aplicação de NuGreen a fôlhas de cafeeiros apresentando sintomas de carência de nitrogênio. (**Note on foliar treatment of nitrogen-deficient coffee seedlings with NuGreen.**) [English summary ¼ p.]
Bol. Super. Serv. Café, S. Paulo, 1954, **29** (329): 17-20, bibl. 4.

Nitrogen-deficient robusta coffee seedlings of the Bourbon variety were treated with the urea formulation NuGreen at 3 concentrations by spraying the upper surfaces of the leaves, with or without, and the lower surfaces without, concomitant carborundum treatment. On the basis of leaf colour, responses were slight and it was concluded that leaf absorption of NuGreen was negligible.—Inst. agron. Campinas.

3278. Robinson, J. B. D.
A note on green-vein chlorosis of coffee.
E. Afr. agric. J., 1955, **20**: 195-7, bibl. 3, illus.

Green-vein chlorosis which occurs in leaves of mature coffee (*Coffea arabica*) is described in detail. It can be corrected by an application of 0·25% w/v ferrous sulphate and is considered to be due to an Fe deficiency in the leaves during periods of rapid vegetative growth. It is not yet possible to say whether under natural climatic conditions control would increase yield. [From author's summary.]—Coffee Res. Stat., Dep. Agric., Kenya.

3279. Saccas, A. M.
Le fusariose des fruits des caféiers en Oubangui-Chari due à *Fusarium equiseti* var. *intermedeum* n. var. (**Coffee berry fusariosis (*Fusarium equiseti* var. *intermedium* n. var.) in Ubangi-Shari.**) [English and Spanish summaries ½ p. each.]
Agron. trop., 1955, **10**: 43-59, bibl. 4, illus.

The disease, which was first observed in 1953 and has caused losses of up to 40%, affects berries of all ages, especially young ones. Infected berries blacken and dry out and, in humid conditions, become covered with a thin, whitish mould. For control, measures which reduce humidity, namely wider spacing, more severe pruning and avoiding heavy shade, and the use of copper fungicides are advocated.

3280. Rojas R., A.
Control de ojo de gallo a base de espolvoreos. (**Control of coffee leaf spot by dusting.**)
Suelo Tico, 1954, **7**: 276-7.

Good control of coffee leaf spot (*Omphalia flavida*) was obtained by hand-dusting with 15 lb. tribasic copper in 85 lb. diatomite four times during the wettest months of the year beginning in June.

3281. Decelle, J.
Quels sont les insecticides à utiliser contre deux ennemis du caféier d'Arabie *Antestiopsis lineaticollis* et *Habrochila ghesquierei?* (**Insecticides for the control of *Antestiopsis lineaticollis* and *Habrochila ghesquierei* (?) on arabica coffee.**)
Bull. Inf. INEAC, 1955, **4**: 67-75.

The use of DDT against *Antestiopsis* (*Antestia*) *lineaticollis* has resulted in an increase in the population of *Habrochila ghesquierei* in coffee plantations in the Belgian Congo and Ruanda Urundi. As the result of trials either lindane or DDT-diazinon or DDT-malathion or DDT-dimetan are recommended for dual control in African-owned plantations. Under proper control in European-owned plantations endrin can replace DDT especially where *Stephanoderes* is present, and parathion can replace malathion or diazinon.—Lab. cent. Div. Phytopath. Ent. agric.

3282. Tapley, R. G.
Insecticidal lacquers and white coffee-borer control.
E. Afr. agric. J., 1955, **20**: 145-8, bibl. 3.

A synthetic lacquer preparation containing 10% dieldrin has given exceptional results in the control of borer beetles and their ring-barking larvae (*Anthores leuconotus*), when compared with other insecticidal lacquers and lacquer used alone. The preparation was still sufficiently active after 8–9 months of exposure to sun and rain to give an 83% kill of beetles, and it also remained effective against ring-barking larvae for the same period. The method of preparing insecticidal lacquers is described.—Dep. Agric., Tanganyika.

3283. Schmitz, G.
La lutte chimique contre la pyrale du caféier en Uele. (**Chemical control of *Dichocrocis crocodora* on coffee in Uele.**)
Commun. sci. IIIe Congr. int. Phytopharm., 1952, Vol. II, being *Phytiatrie-Phytopharm.*, Num. spéc. 1954, pp. 518-21, bibl. 4.

In field tests in 1950 and 1951 the 2 best insecticides were 50% DDT wettable powder and 40% toxaphene wettable powder, each at 1% concentration. They gave mortality rates of 100%, 99·2–100% and 98·1–99·7%, 10, 20 and 25 days after treatment.—INEAC, Bambesa, Belgian Congo.

3284. Willet, J. R.
Bestrijding van de witte koffieluis. (**Control of coffee mealybug.**) [English and Indonesian summaries 10 and 14 lines respectively.]
Bergcultures, 1955, **24**: 149-57, bibl. 8.

A high shade density does not favour the development of *Pseudococcus citri* and *Ferrisia virgata*. Breeding of resistant *Leucaena* shade trees is another possible means of control. Chemicals have been tested to control heavy local infestations. In field trials malathion was the most promising contact insecticide used and was effective either as a dust or combined with medol. In a field trial with systemic insecticides applications of 3% terra sytam (bisdimethylamino fluorophosphine oxide) to 4-year-old coffee trees killed nearly all mealybugs, though there were also some signs of phytotoxicity.—Landbouwk. Afd. M.O.J., Djember.

3285. Calle V., H.
Perspectivas para el empleo de la pulpa y ripios del cafe como materiales curtientes. (**Outlook for the use of the pulp and other residues of coffee as tanning materials.**)
Bol. inf. Colombia, 1955, **6**: 69-71, bibl. 1.

Investigations at the National Centre for Coffee Research suggest that the tannins of coffee and the organic acids obtained by fermenting the residues could be used in tanning.

Guava.

(*See also* 3162.)

3286. Hamilton, R. A., and Seagrave-Smith, H.
Growing guava for processing.
Ext. Bull. Univ. Hawaii **63**, 1954, pp. 19, bibl. 14, illus.

The following subjects are covered in some detail: soil requirements (very adaptable), suitable climatic conditions in Hawaii, optimum characters for processing guavas (3 in. fruit diameter, 1½ in. cavity diameter, 7–10 oz., 1–2% seeds, strong pink colour, pleasant palatable characteristic flavour, 9–12% soluble solids, 300 or more mg. ascorbic acid per 100 g. fruit, few stone cells), characters of selected South African and Californian introductions and of local selections, propagation (by seed, patch or forkert budding on seedlings, air-layering, side-wedge, side-veneer and approach grafting and root cuttings), spacing (18–24 × 10–12 feet), soil management (clean culture or intercropping with vegetables or flowers when young, shallow cultivation or winter covercrop when older), pruning (formation and renewal), fertilizing (including heavy N a month or more before flowering), pest and disease control, harvesting and storage.

3287. Riaz-ur-Rahman, Ahmad S., and Khan, M.-u.-D.
Some studies on the quality of Punjab guavas (*Psidium guajava*).
Punjab Fruit J., 1954, **18** (68/69): 64-9, bibl. 20.

The fruit characters and the acidity, ascorbic acid, sugars and total soluble solids contents are given for 11 unnamed varieties of guava, as a preliminary step in the selection of types for multiplication.

3288. Schrader, O. L.
Observações sôbre o melhoramento da goiabeira (*Psidium guajava* L.). (**Notes on guava selection.**)
Rev. Agric. Piracicaba, 1955, **30**: 45-8, bibl. 7.

Comparisons were made between the fruits of selected local and foreign types of guava growing in the collection at the Institute of Ecology and Agricultural Research. The characters compared were maturation date, shape and weight of fruit, colour and consistency of pulp, number of seeds and ascorbic acid content.

3289. Nelson, R. O.
Propagation of guavas by graftage.
Proc. Fla St. hort. Soc. for 1954, pp. 228-31, bibl. 10, illus.

Recommendations are given for veneer grafting guavas, based on results obtained in Florida. Scions used are selected from terminal growth flushes in which the stem is still green and quadrangular, with well-developed axillary buds. The scions are cut into lengths of 1½ to 2 inches to provide a pair of buds, and the less well-developed bud is either cut out or, if prominent enough, sliced off to make a second graft. After grafting the union is wrapped with a vinyl plastic film strip, leaving a small opening at the top for bud emergence.

3290. Wolfenbarger, D. O.
The guava fruit moth, *Argyresthia eugeniella* Busck.
Proc. Fla St. hort. Soc. for 1954, pp. 290-2, illus.

The biology of the pest is described. The earliest fruits in a given crop are those most commonly attacked. Applications of DDT at 2 lb. of 50% w.p. in 100 gal. water reduced the amount of infested fruit.

Mangoes.

3291. Hyderabad Department of Agriculture.
The mango—a souvenir.
[*Publ.*] *Dep. Agric. Hyderabad*, [undated], pp. 121+11, illus.

This souvenir publication contains 28 short popular articles on different aspects of mango growing, namely history, distribution, varieties, commercial growing, propagation, nursery practice, culture, pests, diseases, costs, marketing and breeding. There are 6 coloured plates of the fruits of different varieties, a guide based on fruit characters to the identification of 89 varieties mentioned in the souvenir and notes on the quality and yield of 38 "new" varieties.

3292. Ledin, R. B.
Mango varieties.
Proc. Fla St. hort. Soc. for 1954, pp. 284-90, bibl. 16, illus.

Descriptions are given of the following new mango varieties that are being planted in Florida: Eldon, Jacquelin, Ruby, Sensation, Adams, Earlygold and Sunset. Other Florida varieties are listed.

3293. Garg, M. L.
Mango grafting made easy and cheap.
Indian J. Hort., 1954, **11**: 145-6, illus.

One-year-old mango seedlings are dug up with a ball of soil round the roots. A layer of moss or hay is wrapped round the ball, which is then enclosed in an alkathene [polyethylene] film bag. The seedlings are hung on mango trees and approach grafted to suitable scions. The advantages of this method are that it is cheap and no watering is needed.

3294. Garg, M. L.
Mango propagation by means of marcotting or air layering.
Indian J. Hort., 1954, **11**: 147-8, illus.

Shoots about 2 years old were selected in July, and an inch-wide ring of rind cut from them. The ringed parts of the shoots were then packed in compost (2 parts leaf mould; 1 part sand), a moss layer, and finally wrapped in an alkathene film. Excellent rooting was obtained with the variety Dasheri, but only 40% rooting with Langra Benarsi.

3295. Soule, M. J., Jr.
Influence of type of graftage, age of plant, and certain environmental factors on the loss of water by young mango budlings.
Diss. Abstr., 1954, **14**: 2174, being *Publ.* 9562 of 358 pp.

Preliminary studies were made on young veneer-grafted Zill budlings and Turpentine mango seedlings grown under greenhouse conditions in open and closed containers. In a 112-day period the rate of water loss was lower with plants watered at 28-day intervals than with those watered at 14-day intervals. About 40% of the loss occurred between 8 a.m. and 12 noon, and 50% from 12 noon to 4 p.m. In general each of the environmental factors had a highly significant influence on water loss rates, but the effect was modified by the other environmental factors. Water losses from young Haden budlings and Turpentine seedlings were measured under greenhouse conditions during a 19-day period. There were 13 treatments, namely veneer graft, chip bud, and seedling controls, each for 4 dates of propagation, and shield bud for one date. The water loss rates of veneer grafts were higher than those for chip buds, and were higher from budded plants than from seedling controls. Rates of water loss differed on a per-plant basis, but not on a unit-leaf-area basis. 44% of the average daily loss occurred in the morning, and 41·2% in the afternoon. In the morning simple correlations for average water loss per hour were highly significant for soil and leaf temperatures, and significant for air temperature and vapour pressure deficit; in the afternoon they were significant for vapour pressure deficit and leaf temperature; in the evening they were significant for air temperature and vapour pressure deficit. A high degree of interrelationship existed among these factors.—Univ. Florida.

3296. Rao, U. N., and Muthuswamy, S.
A note on flower formation from the axillary buds of the mango.
S. Indian Hort., 1955, **3**: 30-2, bibl. 3, illus.

In December, 1954, a number of axillary buds on tipped or ringed shoots of the past season's growth of 2 Mulgoa mangoes at Coimbatore Agricultural College differentiated into inflorescences. If, as has been shown earlier [*H.A.*, 16: 2234 and 19: 2475], the terminal bud is the chief factor in determining the course of the growth of the axillary buds on a shoot, then its removal at the proper time should help to make these axillary buds differentiate inflorescences instead of shoots. Such a practice, judiciously applied annually, is likely to promote regular bearing. Studies on this aspect are under way.

3297. Tripathi, R. D.
"Bunchy top" and "malformation" diseases of the mango.
Indian J. Hort., 1954, **11**: 122-4, bibl. 8, illus.

The mean percentages of bunchy top and malformation were calculated for 6 commercial mango varieties. Variations in bunchy top occurrence were paralleled by those of malformation. There were significant positive correlations between the 2 diseases for varieties taken collectively and individually. The author suggests that bunchy top is a vegetative manifestation and malformation a floral manifestation of the same disease.—Fruit Res. Stat., Saharanpur, U.P.

3298. Shaw, J. G.
Poison-lure sprays for Mexican fruit fly.
Calif. Citrogr., 1955, **40**: 188-90, 192, bibl. 5.

Among sprays tested against *Anastrepha ludens* infesting mangoes in Mexico parathion and malathion, both with protein hydrolysate as an attractant, gave very satisfactory protection. Sprays containing EPN or diazinon with the same attractant afforded little protection to mangoes maturing late during rainy weather.

3299. Singh, S. M.
A note on serious damage to mango crop by *Lymantria mathura* Moore, in Doon Valley.
Indian J. Hort., 1954, **11**: 150, bibl. 1.

Caterpillars of *Lymantria mathura* caused severe damage to fruit trees, including mango and litchi, in 1953. In April more than 80% of the larvae and pupae were attacked by 2 parasitic species. A spray of 2% tar oil wash applied to the trunks of the mango trees effectively controlled the larvae.

Oil palms.

(*See also* 3369y, 3370a, c.)

3300. Toovey, F. W., Hartley, C. W. S., and others.
The West African Institute for Oil Palm Research.
Marketing Publicity Section, Nigerian Information Service, Lagos, [1955], pp. 80, illus.

In this liberally illustrated booklet a semi-popular account is given of the oil palm industry in West Africa and of the establishment of WAIFOR, its administration, development, research policy and implementation thereof, what it has achieved so far and, very briefly, what it hopes to achieve in the future. Much of the ground covered has already been described in the Institute's own journal [see *H.A.*, 24: 926 and subsequent abstracts], but it is convenient to have the information brought together in such a readable, easily digested form.

3301. Prevot, P., and Ollagnier, M.
Diagnostic foliaire du palmier à huile et de l'arachide. **(Leaf analysis of the oil palm and groundnut.)**
Plant Analysis and Fertilizer Problems, [1955], pp. 239-60, bibl. 32, I.R.H.O. Paris, being part of *Proc. 8th int. bot. Congr. 1954.*

Studies are reported on the effects of fertilizers on yields and mineral contents of leaves. For the oil palm the following critical levels were established: N, 2·75–3%; P, 0·15%; K, 1%; Ca, 0·6%; Mg, 0·24%. These elements could be subdivided into protoplasmic elements (N and P), which nearly always gave positive correlations, and basic elements (K, Ca and Mg), which had varying interactions according to their concentration. [See also *H.A.*, 24: 3177.]—I.R.H.O. Paris.

3302. Laudelout, H., Marynen, A., and Meyer, J.
L'application des phosphates à l'aisselle des feuilles du palmier à huile. **(Application of phosphates in the axils of oil palm leaves.)**
Bull. Inf. INEAC, 1955, **4**: 95-6.

At Yangambi monopotassium phosphate tagged with P^{32} was applied as a solution to the axil of the 17th leaf from the centre of the crown, i.e. a medium-aged leaf, of a 2-year-old oil palm. Penetration into the palm and translocation to younger leaves was limited and it is concluded that this is not an effective way of applying phosphates.

3303. Wijbrans, J. R.
Het stamrot van de oliepalm. **(Stem rot of oil palm.)** [English and Indonesian summaries ½ p. each.]
Bergcultures, 1955, **24**: 112-24, bibl. 14, illus.

Stem rot of oil palms, caused by polyporaceous fungi, notably *Ganoderma laccatum*, is described, and its probable method of dissemination is discussed. Preventive control may be obtained by destroying sporophores and diseased palms. The improvement of general growing conditions will help to increase the natural resistance of the palms.

3304. Dell, W.
De aantasting van de oliepalm op Sumatra door *Ganoderma lucidum.* **(Infection of oil palms in Sumatra by *Ganoderma lucidum.*)** [English and Indonesian summaries ⅓ and ½ p.]
Bergcultures, 1955, **24**: 191-201, illus.

Stem rot of oil palms (*Ganoderma lucidum*) has spread on east coast estates of Sumatra since the war. Factors influencing disease intensity are poor cultural conditions and age. Some control of the spread of the disease may be obtained by tracing and destroying the sporophores of the fungus, cutting down and burning seriously infected trees, and by treating newly infected trees with a mixture of tar and carbolineum.

3305. Institut de Recherches pour les Huiles et Oléagineux.
Études sur le carotene de l'huile de palme. **(Studies on palm oil carotene.)**
Sér. sci. IRHO **8**, 1955, pp. 70, bibls, illus.

This publication contains 8 papers which appeared in the journal *Oléagineux* in 1954/55. The authors and translated titles of the papers, 2 of which have been abstracted previously, are: (1) Cuvier, P. (bibl. 35)—General remarks on the carotenes [*H.A.*, 24: 3197]; (2) Desassis, P. (bibl. 94)—Outline of the biochemistry of the carotenoids; (3) Mellier, M.-T. (bibl. 41)—Extraction of carotene from carrot and lucerne; (4) Bienaymé, A.—Palm oils and their carotene content [*H.A.*, 25: 1047]; (5) Argoud, S. (bibl. 57+19)—The unsaponifiable fraction of palm oil; (6) Mellier, M.-T., and Servant, M. (bibl. 22)—Extraction of carotene from palm oil; (7) Servant, M., and Argoud, S. (bibl. 12)—Extraction of carotene from palm oil by treatment with alcohol and distillation of the esters; (8) Jorand, J. (bibl. 65)—Utilization of methyl esters, by-products in the extraction of carotene from palm oil.

Papaws.

(*See also* 3369h.)

3306. Haendler, L.
La papaïne. Le papayer. **(Papain. The papaw.)**
Fruits d'Outre Mer, 1955, **10**: 111-19, illus.

This paper is the first of a series by MM. Huet and Haendler of the I.F.A.C. Central Station at Foulaya in the Ivory Coast. It discusses the environmental requirements of the papaw tree, its culture, exploitation for papain, latex yields, drying, containers and storage, and plantation costs.

3307. Sherman, M., and Tamashiro, M.
Insecticide formulations.
Hawaii Fm Sci., 1955, 3 (3): 1, 7-8, illus.

An account is included of the injuries to Solo papaw caused by acaricides used to control *Tetranychus bimaculatus*. Growth was significantly retarded by both wettable powders and emulsifiable concentrates of parathion at ⅛ lb./100 gal., EPN wettable powder at ½ lb./100 gal., and systox emulsion at ¼ lb./100 gal. No growth retardation was observed with wettable powders or emulsions of malathion at 2 lb., aramite at ⅗ lb. or chlorobenzilate at 1 lb., all in 100 gal. Wettable powders of malathion, aramite, and ovotran did not cause leaf injury at the concentrations used. Some tip burn was caused by malathion and aramite emulsions. Chlorobenzilate induced a mosaic type of chlorosis, which increased at higher concentrations and was more severe with the emulsion than with the powder. Parathion caused severe leaf damage, young leaves showing a mottled chlorosis and older leaves blackened spots which spread until the leaves dropped off. Injury was directly related to concentration.

Pineapples.

(*See also* 3174, 3369a, e, 3370o, 3397.)

3308. Samuels, G., Landrau, P., Jr., and Olivencia, R.

Response of pineapples to the application of fertilizers. [Spanish summary ¾ p.]

J. Agric. Univ. Puerto Rico, 1955, **39**: 1-11, bibl. 8.

The results are given of studies made at Corozal Substation in 1951/53 on the effect of frequency and rate of application of N, P and K on yield of fruit and slips in Red Spanish pineapples. There were no significant yield responses to N when leaf N exceeded 1·66%, to P when leaf P exceeded 0·17%, or to K when leaf K exceeded 4·25%. Slip yields increased with increasing N and K applications.

3309. Angus, D. E.

The use of heaters for frost prevention in a pineapple plantation.

Aust. J. agric. Res., 1955, **6**: 186-95, bibl. 3, illus.

The degree of frost protection afforded by various concentrations of heaters of a simple design [7-qt lard pail type] distributed over an area of 1 acre was studied in a pineapple plantation in southern Queensland. The area over which a given temperature was produced increased linearly with the strength of temperature inversion and also appeared to increase linearly with the concentration of heaters over the range of 53–188 per acre. A concentration of 188 per acre produced a temperature rise of at least 3° F. over about 1 acre and at least 1° F. over 2¼ acres. Tests with a combination of heaters and a wind machine suggest that the area protected is equal to the sum of the areas of protection of the 2 methods used separately. [From author's summary.]—C.S.I.R.O., Melbourne.

3310. Vilardebo, A.

La cochenille de l'ananas (*Pseudococcus brevipes* Ckll.) et le wilt qu'elle provoque. **(The pineapple mealybug (*Pseudococcus brevipes*) and wilt caused by it.)**

Fruits d'outre Mer, 1955, **10**: 59-66, bibl. 10, illus.

Factors favouring mealybug wilt in French Guinea are insolation, low soil moisture, the application of fertilizer in the first half of October during the transition period between the rainy and the dry season as opposed to the second half of October (occasional storms only), and planting in May/June as opposed to July/August. Nitrogen appeared to reduce susceptibility. Experiments in which July-planted plants were artificially infected with mealybugs every month during their first dry season suggested that the pineapple is more susceptible at the beginning than the end of the dry season. Notes are given on the biology and annual variations in the population of the pest. In French Guinea control is obtained with 40–70 c.c. 0·15–0·20% parathion per plant applied just before planting and two or three times after planting.

3311. Tisseau, M. A.

Note sur la destruction des plantations d'ananas en fin de production, par des moyens méchaniques. **(Mechanized destruction of old pineapple crops.)**

Fruits d'outre Mer, 1955, **10**: 73-5, illus.

Mechanized destruction is much cheaper than hand destruction. In French West African experiments a tractor-drawn rotavator cleared 1 ha. (35,000 plants in double lines) in 5–6 hours. Clearance should be followed immediately by a broadcast application of 600–700 kg. ammonium sulphate per ha. and the sowing of a cover crop which can later be cleared with the rotavator and disced in before replanting with pineapples. Other machines are also discussed. A 4–5 disc plough gave excellent results both as regards depth of cultivation and turning under, but its use would only be economical in large plantations.

Rubber trees.

(*See also* 3369i, s, t, y, 3370n, u-w, 3398.)

3312. Evers, M. E.

La présélection en hévéaculture. **(Preselection in rubber growing.)**

Bull. Inf. INEAC, 1955, **4**: 77-81, bibl. 2.

The results were compared of testatex sampling in the nursery, Morris-Mann sampling 3 years after planting out and actual yields after 8 years. In other tests on 3-year-old plants of 6 clonal families (1) trees arising from large seed gave 14% more yield than those from small seed; (2) there was no size difference between plants arising (*a*) from direct-sown seed and (*b*) from seed planted out after pre-germination, but both were larger than plants arising from seed sown at the same time in the nursery and planted out stumped after 2 years; (3) Tj. 1 gave the highest yield in a Morris-Mann test followed by M. 2 and Av. 36. [For an account of earlier work see *H.A.*, 23: 1310.]

3313. Beaufils, E. R.

Recherches sur la variation des constituants minéraux dans les feuilles et le latex de l'*Hevea brasiliensis.* **(Research on the variation of mineral elements in foliage and latex of *Hevea brasiliensis.*)** [French and English.]

Rev. gén. Caoutch., 1955, **32**: 323-31 (French) and 346-53 (English), bibl. 10.

Investigations on Gl. 1, AVROS 308, PR. 107 and Tjir 1 in Indo-China showed that (1) variations in the mineral elements in the leaves are generally interrelated; (2) in the leaves the N/K and K/P ratios are little influenced by origin of plant material, soil, age, season or method of exploitation, but may vary widely when mineral deficiencies occur; (3) latex K/P and leaf K/P are normally of equivalent value, but in cases of K deficiency latex K/P rises and leaf K/P falls until the first may reach twice the value of the second; (4) latex N/K is normally half the value of leaf N/K; (5) a fall in leaf K/Ca is correlated with a rise in latex Mg; (6) variations in N, P and K are associated with variations in minor elements; (7) leaf N, P, K, Cu and Fe and latex N, P, K and Cu are apparently linked with moisture content; (8) Ca, Mg, Mn and Na appear to vary inversely with N, P, K, Cu and Fe. A diagram shows the system of balance between the mineral elements in the leaf.—Inst. Rech. Caoutch. Indochine, Laikhê, Sud-Viêtnam.

3314. van Schoonneveldt, J. C.
Groei en bemesting van jonge hevea in Besuki. (**Growth and manuring of young hevea in Besuki.**) [English and Indonesian summaries 20 lines and ⅓ p.]
Bergcultures, 1955, **24**: 107-12, bibl. 6.

In 1950/51 manurial trials with young rubber trees were started on 3 estates in East Java. After applications of sulphate of ammonia, growth was accelerated. No responses to phosphate or potash applications were observed. Growth acceleration stimulated by N did not, however, compensate for the cost of manuring.—Proefstat. C.P.V., Djember.

3315. Constable, D. H.
Manurial diagnosis for *Hevea brasiliensis*. A progress report of the Agronomy Department for 1951-1954. Part I. General discussion and field results.
Bull. Rubb. Res. Inst. Ceylon **55,** 1955, pp. 34, bibl. 17, illus.

Recent experiments on various soils in 8 localities show that, on the criterion of girth expansion, the use of P alone is not satisfactory (except in North Matale) and NPK is better than P, NP, or PK.

3316. Compagnon, P., and Beaufils, E. R.
Sur l'activité du cuivre, en tant qu'oligoélément, dans l'assimilation minérale de l'*Hevea brasiliensis*. (**On the action of copper in the mineral nutrition of *Hevea brasiliensis*.**)
Reprinted from *C.R. Acad. Sci. Paris*, 1955, **240**: 1493-5, bibl. 4.

Applications of copper sulphate to rubber trees replanted on old rubber soil were shown to stimulate potassium and phosphorus absorption and to increase latex yields. The possible role of copper in hevea nutrition is discussed.

3317. Tixier, P.
Contribution à l'étude des facteurs de résistance de l'hévéa aux maladies de feuilles en général et à l'oidium en particulier. (**Contribution to the study of the factors of resistance in hevea to leaf diseases in general and to mildew in particular.**)
J. Agric. trop. Bot. appl., 1954, **1**: 414-30, bibl. 9.

Investigations in Indo-China show that resistance in hevea to *Oidium heveae* depends upon rapid maturation of the leaf cuticle (about 12 days in resistant varieties), early leaf flush and rapid leaf growth.

3318. Rubber Research Institute of Malaya.
Poisoning hevea with 2,4,5-T.
Plant Bull. R.R.I.M., 1955, No. 17, p. 41.

A 5% acid equivalent solution of normal butyl ester of 2,4,5-T in gas oil painted or sprayed on to the bark from ground level to a height of 15 in. kills rubber trees, usually in 3–4 months. One gallon of the mixture is sufficient for about 25 average trees.

Sugar cane.

(*See also* 2379, 2604, 2734n, 3369p, v, w, 3370f, k, 3395, 3406.)

3319. (Florcruz, C. R.)
The Philippine Sugar Institute.
Sugar News, 1955, **31**: 70-7.

Excerpts from the 1953/54 Annual Report show that research conducted at the Central Experiment Station, Laguna, and at La Granja Experiment Station, La Carlota, included foliar and soil analysis techniques, fertilization, breeding, chemical weed control and variety trials. An Experiment Station at Cadiz was opened in 1954. Field studies were made in various localities on fertilization and leaf scorch disease.

3320. Artschwager, E.
A taxonomic study of *Saccharum sinense* Roxb. and *S. barberi* Jeswiet.
Tech. Bull. U.S. Dep. Agric. **1089,** 1954, pp. 87, bibl. 17, illus.

Ninety-three clones of 5 groups belonging to the northern Indian canes, *Saccharum sinense* and *S. barberi*, were studied, using material collected at the U.S. Sugar Plant Field Station at Canal Point, Florida. After a brief general review of their morphology a description of the clones is given and a classification is made on the basis of the relative prominence of various morphological features. Two keys to the clones are presented, a wheel-key and a conventional key. The paper ends with a discussion on the origin of the North Indian canes.

3321. Arceneaux, G., and Herbert, L P.
Calculation of sugar production from sugar cane variety tests.
Sugar, N. York, 1954, **49** (12): 50-2, bibl. 7.

In computing the indicated yield of sugar per unit weight of cane on the basis of primary juice it is necessary to assume a certain ratio between (1) commercially extractable juice (normal juice) and weight of cane, and (2) composition of primary juice and normal juice. In cases involving a single variety representative constant values for (1) and (2) may be taken without impairing the essential accuracy of comparative measurements, but when comparison is made between varieties varietal differences in these variables must be taken into account. The U.S. Department of Agriculture has made good use of approximate varietal constancy in comparative normal juice extraction and the sucrose reduction factor in the development of its system of varietal tests in Louisiana. A varietal correction factor integrates the combined effects of the departures of a given variety in these two respects from the comparable values of the standard Co. 281. The characters contained in the varietal correction factor are much less sensitive to differential influences of environmental changes than are varietal attributes pertaining to either production of cane per acre or primary juice composition.

3322. Foster, C. B.
The yield of sugar cane in Barbados in 1954.
Bull. Barbados Dep. Sci. Agric. **21,** 1954, pp. 22.

The data include acreage reaped annually in 1945/54, percentage yield of ratoon compared with plant cane crops in 1950/54, tonnages by parishes, annual percentages of acreages of varieties reaped in 1945/54, and tonnages and yields of selected varieties in the 3 rainfall areas. In 1954 B.37161 occupied the greatest part (73%) of the area reaped followed by B.41211 (12·6%). In 1954 B.4744 gave the highest plant cane acre yield in all 3 rainfall areas, but the highest first ratoon acre yields were given by B.41211 in the low and high rainfall areas and by B.41217 in the intermediate.

3323. Ramírez R., C.
Records de producciones y nuevas variedades de cañas de azucar. **(Records of yields and new varieties of sugar cane.)**
Suelo Tico, 1954, **7**: 283-6.

The performances of B.4362, B.37161, and B.41227 were compared with that of a natural hybrid in an experiment at Socorrito experimental farm, Costa Rica, in which harvesting took place at 9½, 11½ and 13½ months. Data are given for cane yield, crude and refined sugar yield, Brix value and bagasse percentage. The best performance was given by B.4362, an early cane which can be harvested from 9½ months onwards.

3324. Taiwan Sugar Experiment Station.
Results of sugarcane variety tests during 1952-1953. [Chinese, with English summary 2 pp.]
Rep. Taiwan Sugar Exp. Stat., 1953, No. 10, pp. 7-34.

The results are summarized of 11 variety trials involving many locally bred seedlings and 4 introduced varieties. Short descriptions are given of 10 promising local varieties.

3325. Locsin, C. L.
Results of some sugarcane variety tests. (1952-53 and 1953-54 milling seasons.)
Sugar News, 1955, **31**: 7-8.

Recommendations based on recent plant cane and first ratoon trials are: (1) H37-1933 and H.39-3633 as good general purpose varieties; (2) H44-3098 as the best yielder but very susceptible to Fiji disease; (3) C.P. 29/116 as the best variety for July/October planting; and (4) N: Co. 310 where leaf scorch is prevalent.

3326. Silva, E.
Variedades de caña de azucar cultivadas en Puerto Rico, 1952/53. **(Sugar cane varieties in Puerto Rico in 1952/53.)** [English summary 1½ pp.]
Bol. Estac. exp. agríc. Río Piedras **121,** 1954, pp. 21.

The area under cane in 1953 was 397,000 acres compared with 360,000 in 1949, 86% being under ratoon crops. The leading variety was P.O.J. 2878 (60% of the total area compared with 65% in 1949) followed by M.336 (5·7%) and B.H. 10(12) (5·4%). The effect of size of farm on the use of new varieties, the geographical distribution of varieties and changes in varietal representation since 1949 are discussed.

3327. Buzacott, J. H.
Rich land and low sugar.
Sugar J., 1955, **17** (9): 30-3, bibl. 1.

The causes of low sugar content of cane grown on certain flooded, alluvial soil types are discussed. In some instances an improvement can be brought about by the grower by careful attention to time of planting, fertilization, time of harvest and varieties planted. In certain cases, however, it is considered that the only possibility of improvement lies in the breeding of varieties to suit the type of land. Reference is made to efforts being made along these lines by the [Queensland] Bureau of Sugar Experiment Stations. [Author's summary.]

3328. Evans, H.
Studies in the mineral nutrition of sugar cane in British Guiana. I—A preliminary survey of the nutrient status of sugar cane using rapid fresh tissue tests.
Trop. Agriculture Trin., 1955, **32**: 124-33, bibl. 9, illus.

The use of rapid leaf tissue tests provided an approximate picture of the general nutritional status of sugar cane on the different estates and soil types in British Guiana. The methods described were only roughly quantitative, in that the proportions of the various minerals removed by the extracting solution varied. The results of the survey are discussed with respect to N, K, P, Ca, Mg, Mn, Fe, Cu, Zn, Mo, sulphate and chloride.—Bookers Sugar Estates, Georgetown, B.G.

3329. Willcox, O. W.
Inverse yield nitrogen law in sugar agriculture.
Sugar, N. York, 1955, **50** (1): 41-4, bibl. 10.

The two elements for producing maximum possible yields are a variety that has the largest capacity for growth and a soil that is fully fertilized. The inverse yield-nitrogen law (which states that, of different kinds of plants growing in the same soil, the one with the lowest nitrogen content will give the greatest yield of dry vegetable substance) governs the yield of sugar cane varieties, and to obtain higher and higher yields breeders should select for lower and lower nitrogen percentages. A "prefertile" soil, i.e. one that is as rich as it need or can be, must contain 10 baules of each of the essential plant nutrients [a baule is that quantity of a plant nutrient necessary to produce 50% of the yield it is capable of producing in a given situation; for amounts above 1 baule the law of diminishing returns operates, so that 10 baules are required to produce 100% of the potential yield]. Given these governing factors, however, sugar production will continue to be dominated by cost and price considerations, and cane farmers will need to exercise their ingenuity to make exact adjustments of their use of plant nutrients and water so as to obtain the closest possible economic approach to the theoretical yields calculated by the agrobiologists for a given variety. [See also *H.A.*, 25: 1094.]

3330. Halais, P.
Nouvelles techniques de diagnostic foliaire au service du redressement alimentaire et de la conduite de la maturation en culture de la canne à sucre. (**New leaf analysis methods to aid nutrition and ripening control in sugar cane.**)
Plant Analysis and Fertilizer Problems, [1955], pp. 136-42, bibl. 7, I.R.H.O. Paris, being part of *Proc. 8th int. bot. Congr. 1954.*

The author describes the methods of leaf analysis used for sugar cane in Mauritius. He considers that an effective N fertilizer will increase the N content and average fresh weight of the blade of the 3rd leaf from the apex and increase the water content of the sheaths. Direct leaf analysis of the 3rd lamina from the apex is used for P and K contents, followed by reference to critical contents. The percentage of water in the sheaths can serve as a guide to the irrigation of ripening cane.—Mauritius Sugar Res. Inst.

3331. Jan, O., and Shah, M. I.
Foliar diagnosis in relation to sugarcane nutrition in N.-W.F.P.
Agric. Pakistan, 1953 (issued 1954), **4**: 151-6, bibl. 11.

Investigations at the North-West Frontier Province Sugarcane Research Station have shown that nitrogen is the controlling factor in the production of a successful crop. In an experiment begun in 1950/51 on a Co. 451 plant cane crop 5 different forms of nitrogen were applied at rates ranging from 70 to 200 lb. N per acre, and the nitrogen content of the plant was determined by analysis of the 3rd fully developed leaf. Results and conclusions were (1) N uptake is at a maximum at 6–7 months old; (2) mustard cake produced a relatively slow increase in leaf N; (3) the higher the mean % moisture in the leaf the greater the green weight of the cane; (4) mustard cake played an important role in the increase of green tonnage per acre; (5) the higher the leaf N the higher the C.C.S. value.

3332. Iljin, W. S.
Bioquímica de plantas cloróticas desarrolladas en suelos calcáreos. (**Biochemistry of chlorotic plants grown in calcareous soils.**) [English summary.]
Agron. trop. Maracay, 1953, **3**: 175-200, bibl. 81, from abstr. in *Soils and Ferts*, 1955, **18**, No. 913.

Plant composition was studied in normal, slightly and severely chlorotic plants of sugar cane and groundnut and soil analyses were carried out. Green plants differed little in composition whether from calcareous or non-calcareous soils, but on both soils there were marked differences in composition between green and chlorotic plants. Chlorosis due to excess of P or Ca and to actual Fe deficiency is discussed. Chlorosis is not inevitable on calcareous soils. Recent work on the effects of Fe, Mn, Cu, B, Mg, K and total salts on chlorosis is reviewed and connexions between chlorosis and variations in production of carbohydrates, citric acid, N compounds and ascorbic acid are discussed.

3333. Evans, H.
A rapid method for the determination of zinc in sugar cane leaf material.
Trop. Agriculture Trin., 1955, **32**: 142-6, bibl. 6.

A rapid and sufficiently accurate method for the determination of zinc in sugar cane leaf material is described. The method is an adaptation of a technique described by Lakin, Stevens and Almond [*Econ. Geol.*, 1949, **44** (4): 296-306] for the field determination of zinc in soils. [From author's summary.]—Bookers Sugar Estates, Georgetown, B.G.

3334. Hoon, R. C., and Sidhu, T.
The physico-chemical changes in deteriorated soils as the result of soil reclamation operations. VI. Studies on the electrical conductivity and pH characteristics of sugarcane.
Irrig. Power, 1954, **11**: 291-300, from abstr. in *Soils and Ferts*, 1955, **18**, No. 945.

A technique using prick electrodes was developed for measuring pH and conductivity changes in the standing cane crop during the growth period. The pH of juice was little affected by adverse conditions of salinity and irrigation, but it was markedly increased by frost. Excessive irrigation and salinity of irrigation water increased conductivity values of the juice according to cane variety.—Res. Stat., Hirakud, India.

3335. Tió, M. A.
Effect of photoperiodism on enzymatic responses of sugarcane. [Spanish summary 13 lines.]
J. Agric. Univ. Puerto Rico, 1955, **39**: 16-21, bibl. 15.

Investigations suggest that extended photoperiods induce either a higher activity of the dehydrogenases present or an increase in the content of these enzymes in the cell of the apical meristems of sugar cane, and that the conditions controlling the activity of the meristems are limited somewhat by the enzymatic activity of the cells of the meristems. The apparently higher metabolic activity induced by a higher content or increased activity of the enzymes in the cells and the prolongation of the vegetative condition of the meristematic cells seem to be interrelated with, and dependent upon, the photoperiod. [From author's summary.]

3336. Sharma, S. L.
Multiple buds in sugarcane.
Proc. Indian Acad. Sci. Sect. B, 1955, **41**: 74-8, bibl. 7, illus.

Of 69 multiple-budded stalks belonging to 24 varieties, several had insect injury in the immediate neighbourhood of the multiple buds, while in many others no outward manifestation of any disturbance was discernible. The incidence of multiple buds varied between varieties. In 8 cases belonging to 5 varieties, multiple buds were associated with curvature in the affected portion of the stalks. In 3 of these and in 7 other cases such buds were formed on alternate nodes. A geotropic disturbance of the stalk is thought to be the cause.—Centr. Sugarcane Res. Stat., Pusa, Bihar.

3337. Srivastava, A. S.
Important pests and diseases of sugarcane in Uttar Pradesh and their control during 1954.
Agric. Anim. Husb. U.P., 1954, **5** (5): 5-6.

Pests referred to are pyrilla, grasshoppers, shoot, stem and root borers, white fly, mite, mealybug, hispa (*Asmangulia cuspidata*), termites and rats. Diseases are red rot, wilt (*Cephalosporium sacchari*), smut, stinking rot (*Bacterium pyocyaneum*), red stripe (*Pseudomonas rubrilineans*), top rot (*Fusarium moniliforme*) and mosaic. Grasshoppers, pyrilla and termites have been effectively controlled with 5% BHC dusts and 0·25% BHC sprays, and field rats with zinc phosphide baits and Cymag fumigation.

3338. HUGHES, C. G.
The control of ratoon stunting disease.
Int. Sugar J., 1954, **56**: 338-40, illus.
Ratoon stunting disease of sugar cane.
J. Aust. Inst. agric. Sci., 1955, **21**: 3-9, illus.

Control is by the exposure of planting material either to hot air at 53–54° C. for at least 8 hours in a sealed oven, or to hot water at 50° C. for 2 hours followed by a mercurial fungicide treatment before planting. Notes are given on apparatus for hot-water treatment and on methods of avoiding field infection.

The second paper discusses the disease under the following headings: historical, symptoms, transmission, causal agent, control, implications.

3339. FORS, A. L.
Algunas conclusiones sobre el raquitismo del retoño. (**Some conclusions regarding ratoon stunting disease.**)
Bol. ofic. Asoc. Téc. azuc. Cuba, 1955, **14** (1): 19-24.

Disease resistance tests were made on plant cane plots of 25 varieties at the Hormiguero centre in 1952/54. B.37161, Badila, C.15792, Co. 13, Co. 453, Cristalina, ML. 3-18 and P.R. 905 were classified as resistant or tolerant, and the remaining varieties as susceptible or very susceptible.

3340. LIU, P. D., AND CHANG, N. C.
The effect of pretreatment of cane cuttings with lime water and aqueous suspension of granosan on the incidence of pineapple disease and the growth of the young plants. [Chinese, with English summary ½ p.]
Rep. Taiwan Sugar Exp. Stat., 1953, No. 10, pp. 57-68, bibl. 14.

This paper presents the results of a series of pot experiments on sugar cane sett treatment conducted from September, 1951, to April, 1952. Variety F.134 was used in all experiments, double-bud setts being used and each treatment replicated 4 times. Experimental results indicate that September is the most favourable planting time, March ranks second, whereas November and January plantings are comparatively much inferior. Very little effect of pretreatment was found in the September planting, but good germination and vigorous growth were found in the November, January and March pretreatments. This indicates that the pretreatment of cane setts is necessary when planting is made at times when the weather is cold and dry. There was no significant difference between a lime water treatment and a treatment using a mixed aqueous suspension of 1·5% lime and 0·01% granosan. The above two treatments were significantly better, however, than other treatments including an aqueous suspension of 0·2% granosan and the check. Lime water or mixed aqueous suspension of lime and granosan not only controlled pineapple disease (*Ceratostomella paradoxa*) but also accelerated early growth. [From authors' summary.]

3341. CHONA, B. L.
Studies on the diseases of sugarcane in India. IV. Relative resistance of sugarcane varieties to red rot.
Indian J. agric. Sci., 1954, **24**: 301-15, bibl. 23.

The results are presented of red rot varietal resistance tests carried out during 1936-49 and the reactions to red rot of 206 varieties are tabulated. Varieties classified as resistant, in that they showed resistance in every test, are Co. 349, Co. 532, Co. 547, Co. 548, Co. 549, B.O. 4 and Co.K. 34.

3342. REYES NÚÑEZ, R.
Estudios preliminares sobre la pudrición roja de la caña de azúcar en el Valle del Cauca. (**Preliminary studies on sugar cane red rot in the Cauca Valley.**) [English summary ½ p.]
Acta Agron. Palmira, 1955, **5**: 51-65, bibl. 38, illus.

Inoculation tests on 10 sugar cane varieties showed that the earliest were the most susceptible to red rot attack and that the lower internodes were more susceptible than the upper. A calculation is made of the theoretical sugar losses in plant and ratoon crops of P.O.J. 2878 from the combined attacks of *Diatraea saccharalis* and *Physalospora tucumanensis*.

3343. BOURNE, B. A.
Antibiosis and the red rot disease of sugar cane.
Phytopathology, 1955, **45**: 37-8, bibl. 7, illus.

A yeast identified as *Candida intermedia*, found associated internally and externally with the sugar cane moth borer and one of its parasites in the adult stage, has been found to be strongly antibiotic against the sugar cane red rot fungus *Physalospora tucumanensis*, but not against an associated red rot organism *Fusarium moniliforme*, commonly encountered in the Florida Everglades. [From author's summary.]—U.S. Sugar Corp., Clewiston, Fla.

3344. CHU, H. T.
Sclerospora leaf split and grain smut in cane variety N: Co. 310 in Taiwan. [Chinese, with English summary 1¾ pp.]
Rep. Taiwan Sugar Exp. Stat., 1953, No. 10, pp. 113-22, bibl. 14, illus.

Notes are given on sclerospora leaf split disease (*Sclerospora miscanthi*) and grain smut (*Sphacelotheca saccharicola?*), 2 rare sugar cane diseases recently found again in Taiwan after an interval of more than 30 years. Thin canes such as N: Co. 310 are susceptible to the former and affected plants die; hot-water treatment of diseased setts at 46° C. for 20 minutes followed by 52° C. for the same period gave complete control.

3345. ANON.
Los taladradores de la caña de azúcar y su control biológico. (**The sugar cane borers and their biological control.**)
Agric. venezol., 1954, **19** (172): 34-7, illus.

Pupae of *Paratheresia claripalpis* and *Metagonistylum minense*, larval parasites of *Diatraea* spp., were introduced from Trinidad and distributed in 1950/51. Local multiplication of *M. minense* began in 1952. The rates of parasitism in 3 different cane zones in 1953 are given as 30, 32 and 29%. It is considered that *M. minense* is breeding naturally and is effectively reducing the *Diatraea* population.

3346. TANDON, R. K., KAPOOR, G. P., AND MISRA, G. N.
Ratooning of sugarcane as influenced by the time of harvesting plant cane.
Indian J. agric. Sci., 1955, **25**: 31-40, bibl. 8, illus.

An experiment was conducted at the Main Sugarcane Research Station, Shahjahanpur, U.P., during the three crop seasons from 1949–50 to 1951–52, to ascertain the best time of harvesting plant cane to obtain a maximum ratoon crop. The treatments consisted of five dates of harvesting plant cane of three popular varieties at monthly intervals from mid-December to mid-April. There appeared to be no interaction between the different varieties of cane and the dates of harvesting. The best ratoon crops were obtained after harvesting plant cane in February or March and the lowest after harvesting in December. [From authors' summary.]

3347. LOCSIN, C. L.
A new ratooning tool for sugarcane.
Sugar News, 1955, **31**: 58-60, illus.

The tractor-mounted Zayco stubble-shaver consists essentially of a simply-constructed, power-operated, sharp-rimmed wheel rotating at right angles to the ridge. Depth of shaving is regulated by a gauge wheel and the maximum penetration is 6–12 in. depending on the power available.

3348. EVANS, H., AND LE GRAND, F.
The rapid analysis of sugar cane stalks for the determination of cane quality.
Trop. Agriculture Trin., 1955, **32**: 134-41, bibl. 2.

A rapid method of analyses of sugar cane stalks for assessment of factory quality is described. A suitable sample of stalks is sawn from top to bottom with a circular saw. A sample of the brei is blended or macerated in a high speed blender with water. The percentage of sucrose, the total soluble materials, and the moisture content are determined. From the data so obtained, a value for available sugar in the cane is derived, which is closely related to recoverable sugar. The method is in current use for maturity testing of sugar cane in British Guiana. [From authors' summary.]—Bookers Sugar Estates, Georgetown, B.G.

3349. TEMBHEKAR, V. V., AND DIVEKAR, M. V.
Inherent characteristics of sugarcane varieties for better gul quality.
Poona agric. Coll. Mag., 1954, **45**: 62-3, bibl. 7.

Investigations on 3 Co. varieties led to the conclusions that good gul (unrefined sugar) colour is a varietal characteristic, and that good gul quality, including colour, is associated with low total N/albumen N, CaO/P_2O_5 and colloids/P_2O_5 ratios and with high P_2O_5, low K_2O and low total N contents.—Sugarcane Res. Scheme, Padegaon.

Tea.

(*See also* 2722, 3369m, u, 3370b, d, r, s, 3400.)

3350. DU PASQUIER, R.
L'avenir de la culture du théier à Madagascar. **(The future of tea growing in Madagascar.)** [English and Spanish summaries ⅓ p. each.]
Agron. trop., 1955, **10**: 7-41, bibl. 14, illus.

The rainy areas at medium and high elevations lying between the East Coast and the plateaux of Madagascar are suitable for growing tea, which would find a ready market in French overseas territories.

3351. LAMB, J.
Organisation of tea research work in Ceylon with special reference to sub-stations and immediate expansion.
Monogr. Tea Res. Inst. Ceylon **3,** 1954, pp. 22.

The retiring Director of the Tea Research Institute outlines the present organization of tea research in Ceylon and makes suggestions for the future with regard to research projects, staff and finance.

3352. NYASALAND (DOWNIE, D. L., AND LAYCOCK, D. H.).
Annual Report of the Tea Research Stations 1953/54.
A.R. Nyasaland Dep. Agric. 1953/54, Part II, 1955, pp. 51-64, also printed as a separate, pp. 25.

Investigations reported include the following: *Nursery*. Pit *vs* bed sowing at Swazi: pit-germinated seedlings were significantly larger than bed-sown 31 months after the experiment began but differences due to fertilizer treatments were not significant. Fertilizer: for the second year NPK fertilization gave a significant diameter increase. *Establishment*. Interim results are given of experiments in which treatments included age and length of plant, fertilizer and shade. *Pruning*. Length of cycle and type of prune (Indian Jat) and length of clean-prune cycle (local Jat). *Tipping*. Yield and wood formation: results were similar to last year [*H.A.*, 24: 3251]. *Plucking*. A 6-day round gave a significantly higher yield than a 10-day, and the 10-day a higher yield (but not significantly so) than a 14-day. *Manuring*. Various fertilizer and time of application experiments are reported. *Spacing*. Two trials on sulphur deficient land indicate the extent to which the S requirement per acre increases with closer spacing. *Weeds and weeding*. Under newly pruned tea N and P increased weed growth but medium K slightly decreased it. Under tea in its second year from pruning N and medium K depressed weed growth. *Shading*. Shade gave a higher yield than no shade, and N a higher yield than no N, especially under no shade. In another experiment *Albizzia* and *Grevillea* gave higher yields than *Gliricidia* and no shade.

3353. LAYCOCK, D. H.
The effect of plot shape in reducing the errors of tea experiments.
Trop. Agriculture Trin., 1955, **32**: 107-14, bibl. 5.

Three areas of tea, two in Nyasaland and one in Ceylon, provide uniformity units which were arranged to give variation of plot and block shapes. At each site, plot and block areas were kept constant and an assessment of the efficiency of each arrangement was made by calculating the standard error of the experiment expressed as a percentage of the mean plot yield (C.V. per cent). Narrow plots running with the slope were always superior to broad plots or to very broad plots across the slope. The effects of block shape were not as consistent, but in two out of three cases broad blocks were more effective than narrow ones. [Author's summary.]—Tea Res. Inst., Mlanje, Nyasaland.

3354. WIGHT, W., AND BARUA, P. K.
Pretreatment of tea cuttings for distribution by mail.
J. hort. Sci., 1955, **30**: 129-30.

Internodal cuttings from 3 tea clones were set in a propagation bed, and groups taken up at fortnightly intervals. After 24 and 48 hours storage in wooden boxes, the cuttings were replanted and the rooting percentage was determined. Storage for 48 hours was not successful. Rooting figures showed that between callus formation and root emergence cuttings could be subjected to severe drying conditions with little loss in viability. Later experiments showed that cuttings pre-treated in the propagation bed for about 5 weeks could be transported for considerable distances when suitably packed in moist powdered charcoal or alkathene film. From a pack containing 50 cuttings, about 12 first grade plants could be expected after a week in transit.—Tocklai exp. Stat., Assam.

3355. WIGHT, W., AND BARUA, D. N.
The nature of dormancy in the tea plant.
J. exp. Bot., 1955, **6**: 1-5, bibl. 4, illus.

Recurrent dormancy of the terminal bud of an elongated tea shoot is due to an interruption in the differentiation of leaf initials. Bud dissection of plucked shoots shows that when the ratio of the length of the bud to the length of the topmost leaf of the shoot is greater than 0·5, the number of leaf initials is at least one more than when the ratio is less than 0·5. The ratio of frequencies of buds less than a half to those more than a half of the topmost leaf is defined as the dormancy index. Field determinations on plucked and unplucked bushes showed the indices to be closely correlated, indicating that changes in the morphological condition of the buds in both sets of bushes proceeded simultaneously in the same direction. Thus the condition of the buds appears to be caused by factors inherent in the proximal parts of the plant, which are not plucked. Growth in length of the feeder root system also shows periodic fluctuation, and this, together with a reduction of vascular tissue below the bud, may be the factor controlling the periodicity of the top growth.—Tocklai exp. Stat., Assam.

3356. CHENERY, E. M.
A preliminary study of aluminium and the tea bush.
Plant and Soil, 1955, **6**: 174-200, bibl. 38.

A study of Al uptake by the tea bush showed that it was strongly absorbed by healthy plants of all ages. Al was accumulated in mature leaves, with little storage in stems or woody roots. There was no direct relation between Al content and blister blight resistance. Al occurred to a greater extent than normal in flushes showing tea yellows. Al uptake was found to be gene-controlled, occurring at different levels in the 3 main sub-species. The presence of abundant available Al in the soil did not prevent excessive Mn uptake. Al tended to diminish leaf P, while Mn tended to increase it. There was evidence that Al stimulated root growth. Soil extractions showed that exchangeable Al was almost absent in soils with a pH above 6·0. Foliar applications of Al had some physiological effect on chlorotic leaves but could not compensate for adverse soil conditions. Methods of analysis used are described.—Rothamsted exp. Stat., England, and Kawanda Res. Stat., Uganda.

3357. CHILD, R.
Copper: its occurrence and role in tea leaf.
Trop. Agriculture Trin., 1955, **32**: 100-6, bibl. 25.

No disease due to copper deficiency has been established for tea, though there is little doubt that the element is essential for growth. There are indications that copper sprays have a "tonic" effect apart from their function in combating disease. Copper is an essential element in the fermentation of tea leaf, the polyphenol oxidase involved in fermentation being a copper protein. Unsatisfactory fermentations seem generally to be associated with copper contents of tea leaf below 12 p.p.m. Clonal differences in copper content and the effect of soil on copper content are discussed.—E. Afr. Tea Res. Inst.

3358. TOLHURST, J. A. H.
Magnesium and manganese deficiencies in the nutrition of the tea bush.
Tea Quart., 1954, **25**: 84-6, bibl. 3.

The most characteristic leaf symptom of magnesium deficiency is a diffuse yellowish-brown to coffee-coloured mottling in between the main veins and towards the centre of the leaf; other symptoms are pale coloration, dullness and brittleness and sometimes up-folding of the older leaves and poor growth. Manganese deficiency is characterized by a yellow pattern on both young and old leaves which remain dark and glossy except for bright, greenish-yellow, fairly sharply defined tongues between the main veins and, in severe cases, narrow bands at the edges. The leaves become small and hard and the flush is poor.

3359. DŽEMUHADZE, K. M., AND ŠALJNEVA, G. A.
Transformation of catechins during the development of tea leaf. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **99**: 1069-71, bibl. 14.

Quantitative chromatographic analyses of tea leaves have shown that the 1st and 2nd leaves of the flush and the buds contain more *l*-epigallocatechingallat and *l*-epicatechingallat than the 3rd leaf and the stem. The contents of *l*-epigallocatechin and of *l*-epicatechin+*d.l*-catechin+*d.l*-gallocatechin were higher in the 3rd leaf and reached a maximum in the stem.

3360. HOMBURG, K.
Enige resultaten van de blisterblight bestrijdingsproeven in het Patuha'se. **(Some results of blister blight control in the Patuha region.)** [English and Indonesian summaries ½ p. each.]
Bergcultures, 1955, **24**: 169-85, bibl. 2, illus.

The intensity, duration and distribution of sunshine proved to have an important influence on the incidence of blister blight (*Exobasidium vexans*). Investigations showed that there was a negative correlation between the number of hours of sunshine during the morning and the incidence of the disease. In an area at 1,600 m. above sea-level which received 80% of the morning sunshine, the critical limit for a blister blight attack was 5 days with an average of 3 hours morning sunshine. The persistence of copper dusts and suspensions was tested and reliable protection was obtained from a 6- to 7-day cycle for spraying and one of 4–5 days for dusting. Copper oxychloride still proved the best fungicide available. [See also *H.A.*, 24: 1008.]

3361. HOMBURG, K.
Het optreden van mijt in de thee-cultuur. **(The occurrence of mites in tea growing.)** [English and Indonesian summaries ¼ p. and ½ p.]
Bergcultures, 1955, **24**: 55-67, bibl. 7, illus.

Mites have once again assumed an economic importance in Indonesia, probably largely as a result of changes in cultural methods adopted after the appearance of blister blight. In Indonesia 3 species have been observed, namely *Tenuipalpus obovatus*, *Eriophyes theae* and *Tarsonemus translucens*, and these as well as *Tetranychus bioculatus* and *Eriophyes carinatus* are described. Improved cultural conditions aimed at maintaining the plants in a healthy condition will render them less susceptible to mite attack. Chemical control was most successful with sulphur, Medol and diphenyl sulphone. A 70% sulphur dust gave 52% mite control in the field. Medol, a light oil emulsion, used at 2,000 c.c. in 200 l. water per ha., gave 85% acaricidal and 58% ovicidal control. Diphenyl sulphone at 200–400 c.c. per hectare gave 78% acaricidal control. All 3 materials were effective against *Eriophyes theae* and *Tenuipalpus obovatus*; Medol was the most successful against *Tarsonemus translucens*.

3362. D[UTTA], S. K., AND H[EATH], E. D.
Replanting of tea.
Ser. Tea Res. Inst. Tocklai **105**, 1954, pp. 5, illus.

Points on which advice is given include the age at which tea should be replanted, methods of uprooting, preparation of the land and cover cropping for 1–3 seasons before replanting with tea.

Sundry crops.

3363. PREST, R. L., AND ROSS, A. A.
The custard apple.
Qd agric. J., 1955, **80**: 17-21, illus.

The custard apple grown commercially in Queensland is probably a hybrid between *Annona cherimola* and *A. squamosa*. Notes on its culture are given.

3364. SINGH, S. N.
Studies on the rootage of fruit plants in relation to hormones. IV. *Artocarpus heterophyllus* Lam.
Sci. and Cult., 1955, **20**: 393-5, bibl. 5, illus.

In marcotting tests on jack fruit only β-indolylbutyric acid at 1%, among several growth substances tried, markedly stimulated rooting. Dark-brown shoots, 2–2½ years old, gave better results than younger ones. In trials with apical, semi-hard and hardwood cuttings none of the growth substances tested induced rooting.—Nat. bot. Garden, Lucknow.

3365. SINGH, K. K., AND MATHUR, P. B.
A note on investigations on the cold storage and freezing of jack fruit.
Indian J. Hort., 1954, **11**: 149, bibl. 1.

The optimum conditions for the cold storage of jack fruit (*Artocarpus integrifolia*) are a temperature of 52–55° F. and R.H. 85–95%. The approximate storage life is 3–6 weeks. Slices of ripe fruits were packed in 50% sugar syrup with 0·5% citric acid, and were frozen at −20° F. before being stored at 0° F. Satisfactory storage for 1 year was obtained.—Cent. Food tech. Res. Inst., Mysore.

3366. KALSHOVEN, L. G. E.
Scolytids in relation to premature death of nutmeg trees (*Myristica*) in Sumatra. [Indonesian summary 1 p.]
Contr. gen. agric. Res. Stat., Bogor, **140**, 1954, pp. 16, bibl. 21.

Investigations of several cases of sudden death in nutmeg trees in the Indo-Malayan region during the past 25 years have not resulted in agreement on the role of scolytid beetles in initiating the disease.

3367. DE PERALTA, F., AND DE LA CRUZ, J. E.
Preliminary study of vegetative propagation of chico.
Araneta J. Agric., 1954, **2** (1): 24-32, bibl. 7.

Six-inch stem-tip cuttings of sapodilla, *Achras sapota*, failed to root in five different soil media, whether or not they had been treated beforehand with Rootone No. 10 or α-NAA.

3368. AROSTEGUI, F., AND OTHERS.
Studies on the West Indian cherry, *Malpighia punicifolia* L.; observation and data on a promising selection. [Spanish summary.]
Proc. Fla St. hort. Soc. for 1954, pp. 250-5, bibl. 8, illus.

A selection of West Indian cherry, clone B-17, has larger fruit and higher juice yields with a higher vitamin C content than average.—Univ. Puerto Rico.

Noted.

3369.

a ANON.
La piña y su cultivo. **(The pineapple and its culture.)**
Agric. venezol., 1954, **19** (170): 18-21, illus.
Including a list of common varieties in Venezuela.

b ANON.
A note on the performance of arecanut in Kallar Fruit Station.
S. Indian Hort., 1955, **3**: 28-9.
Culture, yields, germination.

c Burgos L., J. A.
Propagación vegetativa del cacao por los métodos de injerto y de estacas enraizadas. **(Vegetative propagation of cacao by budding and by rooted cuttings.)**
Circ. ext. Estac. exp. agríc. Tingo María **49,** 1954, pp. 17, illus.
Recommendations on patch-budding and on cuttings rooted in sawdust.

d Buyckx, E. J., and Fraselle, J. V.
Susceptibilité du caféier robusta à l'intoxication par l'arsenic. **(Susceptibility of the robusta coffee tree to arsenic poisoning.)**
Commun. sci. IIe Congr. int. Phytopharm., 1952, Vol. II, being *Phytiatrie-Phytopharm.,* Num. spéc., 1954, pp. 712-14.
Arsenical insecticides apt to be phytotoxic.

e Carter, W.
Dichloropropane-dichloropropene mixtures of different composition as soil fumigants in pineapple land.
J. econ. Ent., 1954, **47:** 1101-3, bibl. 1.
Growth responses as measured by fruit weight in comparison with standard D-D.

f Castaño A., J. J., and Bernal Escobar, G.
Un método práctico para combatir el mal rosado del cafeto. **(A practical method of controlling coffee pink disease.)**
Agric. trop. Bogotá, 1953, **9** (7): 53-7, illus.
Corticium salmonicolor controlled with 0·4% perenox at 2–4 l. per tree.

g Champion, J.
La culture bananière aux Antilles et en Amérique centrale. IV. La culture bananière en Colombie (Région de Santa-Marta). **(Banana growing in the Antilles and Central America. IV. The Santa Marta district of Colombia.)**
Fruits d'Outre Mer, 1955, **10:** 53-8, bibl. 1, illus.

h Chateau, R.
Notes sur le genre *Carica* L. **(Notes on the genus *Carica*.)** [Flemish summary ¼ p.]
Bull. agric. Congo belge, 1955, **46:** 261-70, bibl. 20, illus.
Taxonomy of the genus and origin and distribution of *C. papaya.*

i Constable, D. H.
Potassium deficiencies.
Adv. Circ. Rubb. Res. Inst. **37b** (Supplement to No. 37, 1954, pp. 4, illus.
Symptoms and control in rubber, costs, clonal susceptibility, preventive manuring.

j Council of Scientific and Industrial Research, New Delhi.
Literature review on fats and oils, 1952.
[Publ.] Coun. sci. industr. Res., India, 1954, pp. 27.
Including coconut culture and processing.

k Crandall, B. S.
The diseases of the cinchona tree.
FAO Plant Prot. Bull., 1954, **3:** 33-7.
In the Western Hemisphere, with notes on control.

l D[as], G. M.
Green caterpillar—defoliating nursery and young shade plants.
Ser. Tea Res. Inst. Tocklai **103,** 1954, pp. 3.
Rhesala moestalis and its control with BHC.

m D[as], G. M.
Pink and purple mites.
Ser. Tea Res. Inst. Tocklai **104,** 1954, pp. 2.
Acaphylla steinwedeni and *Calacarus carinatus* and their control on tea.

n Davis, T. A.
A "leaf sampling knife" suited for coconut and similar palms.
Indian Coconut J., 1954, **8:** 26-9, bibl. 3, illus.
Long-handled clippers.

o Davis, T. A., Anandan, A. P., and Menon, K. P. V.
Hermaphroditism in *Cocos nucifera* L.
Indian Coconut J., 1954, **7:** 133-42, bibl. 15, illus.

p van Dillewijn, C.
Cane culture in Japan.
Sugar, N. York, 1954, **49** (8): 40-1.
Now expanding again after wartime decline.

q Eidt, R. C.
Plantaciones de banano en Sevilla, Col. **(Banana plantations at Sevilla, Colombia.)**
Agric. trop. Bogotá, 1953, **9** (7): 9-17, bibl. 2, illus.
Including spraying against leaf spot with overhead booms.

r Euverte, G.
L'entretien mécanique des plantations de caféiers robusta. **(Mechanization in robusta coffee plantations.)** [English and Spanish summaries 6 lines each.]
Agron. trop., 1955, **10:** 226-30.
Spacing and the choice of tractors and implements.

s Ewart, K.
Report on mechanization of agricultural crops in New Guinea. Mechanization of cacao, lowland coffee and rubber.
Papua N. Guinea agric. Gaz., 1954, **9** (1): 27-34, illus.
Planting, regrowth clearance and general transport.

t Fernando, D. M.
Phytophthora leaf disease and stem dieback of hevea.
Adv. Circ. Rubb. Res. Inst. Ceylon **45,** 1954, pp. 4, illus.
P. palmivora and its control.

u Glover, P. M.
Shade.
Two and a Bud, 1954, **1** (4): 8-11.
For tea, *Albizzia* spp., *Gliricidia maculata, Leucaena glauca.*

v GÓMEZ A., F., AND CAMPOS G., H.
Variedades de caña de azúcar. **(Sugar cane varieties.)**
Agric. venezol., 1954, **19** (173): 14-15, 45.
172 varieties in collections in Venezuela.

w GRINDROD, J.
Sugar production in Indonesia.
World Crops, 1955, **7**: 163-4.
Post-war reconstruction of the industry.

x GUILLAUMIN, A.
Les plantes utiles des Nouvelles Hébrides. **(Useful plants of New Hebrides.)**
J. Agric. trop. Bot. appl., 1954, **1**: 293-7, 453-60.
Botanical name, part of plant used and purpose, where found, vernacular name.

y HARGOT, F.
Monographie agricole du Maniema. **(Monograph on agriculture in Maniema.)** [Flemish summary 3 pp.]
Bull. agric. Congo belge, 1955, **46**: 1-56, bibl. 15, illus.
Coffee, oil palms, rubber and lemon grass.

z HARTLEY, C. W. S.
The improvement of the West African natural palm groves.
World Crops, 1955, **7**: 143-8, bibl. 5, illus.
For a more detailed account see *H.A.*, 25: 1040.

3370.

a JACKSON, E.
La importancia del cultivo de la palma africana en el costa atlántica de Nicaragua. **(The importance of the oil palm crop on the Atlantic coast of Nicaragua.)**
Reprinted from *Rev. Agric. Ganad.*, 1953, **3** (37): 20-2.
Nursery practice, transplanting, spacing, maintenance and yields.

b JAKOBS, H., AND KEYZER, L. A.
Het epicyclisch rollen van thee. **(Epicyclic rolling of tea.)** [English and Indonesian summaries 18 and 23 lines respectively.]
Bergcultures, 1955, **24**: 135-41, bibl. 7.
The Ceylon method applied to Indonesia.

c JANSE, A. R. P., HULSBÓS, W. C., AND OCHS, R.
Étude des modifications physiques d'un sol de savane par la culture du palmier à huile. **(Study of physical changes in a savannah soil due to oil palm growing.)**
Oléagineux, 1955, **10**: 321-31, bibl. 17, illus.
Both physical and chemical changes.

d KEEGEL, E. L.
Withering by heated air.
Tea Quart., 1954, **25**: 87-92.
General advice on withering tea leaf.

e LEUPEN, F. F.
Mededeling over de selectie en toetsing van robustakoffieplantmateriaal in het ressort van het Besukisch Proefstation. **(The selection and testing of new robusta coffee planting material in the area of the Besukisch Experiment Station.)** [English summary $\frac{3}{4}$ p.]
Arch. Koffiecult., 1955, **17**: 165-86 plus 4 tables.
Including recommendations on clones and legitimate seedlings for large and small scale planting.

f LIU, H. P., AND LI, H. W.
Studies on sugarcane mosaic virus in Taiwan. Part II. The mode of resistance of cane varieties and the wild relatives of cane to strains of mosaic. [In English.]
Rep. Taiwan Sugar Exp. Stat., 1953, No. 10, pp. 89-102, bibl. 13.

g LOUÉ, A.
Étude de la nutrition du caféier par la méthode du diagnostic foliaire. **(Study of coffee nutrition by leaf analysis.)**
Plant Analysis and Fertilizer Problems, [1955], pp. 208-16, bibl. 3, I.R.H.O. Paris, being part of *Proc. 8th int. bot. Congr. 1954.*
For a more detailed account see *H.A.*, 24: 4331.

h MATHUR, P. B., AND SRIVASTAVA, H. G.
Preliminary experiments on the cold storage of durian (*Durio zibethinus* Murr.).
Bull. centr. Food tech. Res. Inst. Mysore, 1954, **3**: 199-200, from abstr. in *Fruits d'Outre Mer*, 1955, **10** (3), Suppl. *Fruits trop. subtrop.*, No. 12-9739.
Optimum conditions were 4–5° C. and 85–90% R.H.

i NAYAR, T. G., SUNDARARAJ, J. S., AND BAKTHAVATHSALU, C. M.
Abnormalities in bananas (a note on the teratology of twin bunching in the variety Poovan).
Indian J. Hort., 1954, **11**: 119-21, bibl. 4, illus.

j O'CONNOR, B. A., PILLAI, J. S., AND SINGH, S. R.
Notes on the coconut stick insect, *Graeffea crouani* Le Guillou.
Agric. J. Dep. Agric. Fiji, 1954, **25**: 89-92, illus.
Mechanical, chemical and biological control.

k ORIAN, G.
La maladie du rabougrissement de la canne à sucre. **(Ratoon stunting disease of sugar cane.)**
Rev. agric. Maurice, 1954, **33**: 275-84.
Discovered in Mauritius in 1953; effects and control discussed.

l Rao, C. V.
Embryo development in areca-nut.
Nature, 1955, **175**: 432-3, bibl. 2, illus.

m Rao, M. B. S., and Subbiah, V.
An abnormal coconut seedling.
Indian Coconut J., 1954, **8**: 30-1, bibl. 2, illus.
It produced a terminal inflorescence when 12 months old.

n Rubber Research Institute of Malaya.
Planting recommendations, 1955/56.
Plant. Bull. R.R.I.M., 1955, No. 18, pp. 46-9.
Clones for large- and small-scale planting.

o Santini, R., Jr., and Sotelo, E.
Determination of O,O-diethyl O-*p*-nitrophenyl thiophosphate (parathion) in pineapples.
J. Agric. Univ. Puerto Rico, 1955, **39**: 12-15, bibl. 1.
The Averell-Norris (*Anal. Chem.*, 1948, **20**: 753-6) method gave reliable results.

p Sundararaj, D. D.
***Musa acuminata* Colla., wild seeded banana from Madras State.**
S. Indian Hort., 1955, **3**: 16-20, bibl. 10, illus.
Taxonomy.

q Tollenaar, D.
De toekomst der cacao-cultuur. Inzichten gegrond op ervaringen opgedaan in Latijns Amerika. **(The future of cacao-growing. Views based on experience in Latin America.)** [English and Indonesian summaries ½ p. each.]
Bergcultures, 1955, **24**: 79-97, bibl. 35, illus.
No appreciable increase in production in Latin America is expected.

r Walter, T. E.
Starch deficiency. A review of its causes and effects with special references to types of pruning in the low-country.
Tea Quart., 1954, **25**: 96-9, bibl. 6.
In tea; a review of Ceylon work.

s van Wijk, J.
Resultaten van de epicyclische rolling met snijconus. **(Results of epicyclic rolling [of tea leaf] with a cutting cone.)** [English and Indonesian summaries 6 and 7 lines respectively.]
Bergcultures, 1955, **24**: 143-9, illus.
The cone described gave very good results.

t Williams, G.
Field observations on the cacao mirids, *Sahlbergella singularis* Hagl. and *Distantiella theobroma* (Dist.), in the Gold Coast. Part III. Population fluctuations.
Bull. ent. Res., 1954, **45**: 723-44, bibl. 7.
Including factors important in natural control. For earlier parts see *H.A.*, 24: 879 and 1962.

u Young, H. E.
White root disease of hevea, *Leptoporus lignosus* (*Fomes lignosus*).
Adv. Circ. Rubb. Res. Inst. Ceylon **46**, 1954, pp. 8.
Including control, precautions in replanting, poisoning old rubber, nursery infections.

v Young, H. E.
Brown root disease of hevea caused by *Fomes lamaensis* (Murr.) Sacc. ex Trott.
Adv. Circ. Rubb. Res. Inst. Ceylon **48**, 1954, pp. 2.
Symptoms, biology, spread, and control.

w Young, H. E.
Bird's eye leaf spot of hevea.
Adv. Circ. Rubb. Res. Inst. Ceylon **51**, 1954, pp. 3.
Helminthosporium heveae and its control.

NOTES ON BOOKS AND REPORTS.

Books.

3371. Avery, B. W.
***The soils of the Glastonbury district of Somerset.* (*Sheet 296*),** being *Memoirs of the Soil Survey of Great Britain*, (*Sheet 296*). Ministry of Agriculture, Lond., 1955, pp. 131, bibl. 35, illus., map, H.M. Stationery Office, 15s.

Little of the area is devoted to horticulture. It contains, however, some grass orchards, mainly of cider apples, and basket willows are cultivated near Langport. A few details are given on the occurrence and location of these two crops and of the cultivation practices adopted.

3372. Bedson, F. J.
Successful begonia culture.
Collingridge, London, 1954, 9×5½ in., pp. 84, illus., 15s.

There are over 1,000 species of begonia and countless thousands of hybrids, and, though restriction of space has prevented the author from discussing even the most popular 500 as he would dearly have liked, he does manage to disclose the family affairs, pedigrees and idiosyncrasies of a very large number. A begonia with anything to hide had better keep away from Mr. Bedson. This method of presentation raises the book well out of the rut of the usual small handbook. Mr. Bedson is sensitive to the romance attached to plant-collecting and to the work of the hybridist. It does seem incredible that in something under 35 years the huge and gorgeous rose-shaped blooms (or coloured cabbages, as preferred) should have been built up from parent species with flowers no bigger than a finger-nail. The tuberous begonia, the only begonia of which many people are aware, is but one of a number of types. Here, for instance, the rhizomatous begonias are divided into three classes, the fibrous into five, each with numerous subdivisions, species and varieties. The histories of many of these are recorded so that there is not a great deal of space available for the practical side. Cultivation is given 12 pages, propagation 4. As it happens this is enough. The begonia is not a difficult plant. Neither black magic nor green fingers but the observance of a few basic principles are needed to ensure a hearty and floriferous response. This monograph in miniature will be found well worth while to those interested in the family. G.St.C.F.

3373. Bennett, H. H.
Elements of soil conservation.
McGraw-Hill, New York, Toronto, London, 2nd edition, 1955, 9×6 in., pp. 358, bibl. pp. 8, figs 108, 28s. 6d.

H. H. Bennett was Chief of the Soil Conservation Service of the U.S. Department of Agriculture from 1935 to 1951, and thus played a very large part in making people throughout the world conscious of the menace of soil erosion and in developing effective means of combating it. His aim in this book has been to provide a guide, not only for those who are directly concerned with the work of conserving soil and water, but also for teachers and students in other walks of life, who are, or should be, interested in the problem. The subject is, therefore, treated in as simple and straightforward a manner as possible and the text is amply supported by many striking and effective photographs.

Nearly one-third of the book is devoted to the nature, effects and extent of erosion in the United States, where the annual national loss due to it is estimated at nearly 1,000 million dollars. The remainder of the book is devoted to the many ways, direct and indirect, in which soil and water can be conserved. Although examples are taken almost entirely from arable and pasture areas, the principles established and the methods so clearly described can be applied equally well in horticultural areas. However, one problem peculiar to the horticulturist remains unresolved. The grower of tree or bush crops looks in vain here for guidance on the effects of non-uniform spacing, an inevitable feature of any contour planting system on land with irregular slopes.

This book may be recommended as an admirable antidote to the idea, still current in some quarters, that conserving what we have is a dull business by comparison with developing something new. Much of the work already done is exciting and satisfying in its results. What remains to be done is enormous, and Bennett rightly urges more speed. Would it be going too far to suggest that the alternative would be to concentrate on methods of preparing processed plankton for the dinner parties of the atomic age?
G.K.A.

3374. Boell, E. J. (Editor) and others.
Dynamics of growth processes.
Princeton University Press, Princeton, N.J., 1954, $9\frac{1}{2}\times6$ in., pp. 304, bibls numerous, illus., $7.50 or 60s.

This book contains the thirteen papers read in June, 1952, at the eleventh symposium of the Society for the Study of Growth and Development. Previous symposia have been published as supplements to *Growth*. The individual papers not specifically concerned with animal growth processes are:

Kozloff, L. M. Virus reproduction and the replication of protoplasmic units. 18 pp. The infective unit is rapidly changed to a latent form in the cell and new virus is built up by the infected cell from non-specific protein units. Tracer techniques were used extensively. This paper seems to disprove any "template" theory for virus reproduction, and, by extension, for genes and enzymes.

Novick, A., and Szilard, L. Experiments with the chemostat on rates of amino-acid synthesis in bacteria. 12 pp. The chemostat maintains a controlled environment by continually adding fresh nutrient to the culture at such a rate that the overflow carries away sufficient bacteria to maintain a constant population.

Fankhauser, G. Interaction of nucleus and cytoplasm in cell growth. 27 pp. The influences of mitosis, ploidy and heredity on the ratio of nucleus to cytoplasm are discussed.

Van Fleet, D. S. Cell and tissue differentiation in relation to growth (plants). 19 pp. Although plant tissues show abrupt changes in their histology, little is known concerning the biochemistry of such changes. Information is given on endodermis formation, localization of regions where conditions are comparatively oxidizing or reducing and localization of enzymes.

Went, F. W. Physical factors affecting growth in plants. 18 pp. After brief discussion on light and temperature effects (including the fractional Q_{10} for translocation) attention is drawn to the possible role of diffusion in formative and intracellular processes. It is unfortunate that Turing's 1952 paper dealing specifically with diffusion rates in organisms was presumably published too late to have been discussed.

Skoog, F. Chemical regulation of growth in plants. 35 pp. Contemporary work has been reviewed bringing support to the thesis that "capacities for growth and differentiation are not a question of so-called 'determinism' but rather of availability of the required growth factors". "Growth factors" is the key word, with special reference to adenine. There is nothing about weed-killers.

Sholl, D. A. Regularities in growth curves, including rhythm and allometry. 18 pp. The allometric equation $y=bx^k$ approximates to a wide range of second order curves, and consequently has been widely used by biologists who can rarely get a straight line on their problems. We are warned yet again against its indiscriminate use, especially where elaborate hypotheses are built on the k-parameter and where no account has been taken of its variation. . . . The latter two-thirds of the paper gives a study in detecting periodicities in growth data.

The published symposium is the contemporary equivalent of the "Recent Advances" of the thirties and of the review article of the first quarter-century. As the field of biological science widens, so the range covered by one person is proportionately less, and what was once an individual possibility has now become a co-operative necessity. The field of this symposium is growth processes (it is difficult to visualize static growth) and despite reference to some 800 authors and 1,600 papers the coverage is imperfect. Nevertheless good readable reviews are given by Kozloff, Fankhauser and Skoog, while the papers by Went, Sholl and Van Fleet are valuable on their own merits, if not as reviews. The interval between the meeting and publication puts mere readers at least 2 years behind those fortunate enough to have attended as members. D.H.M.

3375. Collings, G. H.*
Commercial fertilizers. Their sources and use.
McGraw-Hill, New York, Toronto, London, 5th edition, 1955, 9×6 in., pp. 617, bibl. 808, illus., $8 or 60s.

The new edition of this well-known textbook will be of particular interest to senior agricultural students and to general farmers who want to know what they are buying and for what purpose. After an introductory chapter and 11 others devoted to N, P, K, S, Ca and Mg the author considers the necessity for and use of Mn, B, Cu, Zn and Mo in the light of modern American research. In Chapter 14 he usefully discusses the possible influence or use of Na, Cl, Si, Al, Co and I, with a very brief note on the use of radioactive materials as fertilizers. A further chapter is devoted to soil reaction and its influence on nutrient availability. The principles which should underlie both the purchase and use of fertilizers are considered and in two final chapters, the first entirely new to this book, the methods of applying fertilizers in liquid and in dry form are given attention. In this last chapter the chief recommendations made by the National Joint Committee on Fertilizer Application published in 1948 on methods of applying fertilizers to particular crops including many vegetables, and, very briefly, citrus and deciduous fruits, are reproduced. D.A.

3376. Gray, A.
Miniature daffodils.
Collingridge, London, 1955, 9×6 in., pp. 57, illus., 15s.

That the author should be well qualified to write this book will be obvious to those who have seen his spring exhibits of miniature daffodils at the R.H.S. fortnightly shows. Here, annually, he produces a fascinating array of miniature blooms in a seemingly endless succession of species and varieties whose ethereal charms leave their Big Brothers on the neighbouring stands looking distinctly lumpish. Hitherto there has been no work in book form dealing exclusively with miniature daffodils. Modern books on the narcissus, obsessed with the achievements of the hybridists working on the larger types, have space for only superficial mention. What they omit, this little book supplies. The greater part of the book is taken up with aspects of cultivation indoors and outdoors, seed raising, hybridization and so on. The most pernicious of the few pests and diseases are the two narcissus flies, the bogies of all daffodil growers. So difficult are they to control that Mr. Gray thinks that in a small garden the best way is to go out and swat them! His own game book records a bag of 300 in a short morning. Hints on the proper conduct of the chase are provided and no holds barred. The chapter on species and varieties deals quite comprehensively with these and their hybrids, with cultural notes where needed. An excellent book on a delightful race of plants by a writer who knows his subject. His enthusiasm is backed by photographs which in themselves could not fail to bring converts to the cult. G.St.C.F.

3377. Holmes, E.
Practical plant protection.
Constable & Co., London, 1955, 9×6 in., pp. 252, bibl. 13, illus., 15s.

The claim on the dust-cover—"This is a book for the average grower"—is not exaggerated. Dr. Holmes, who is a familiar and respected figure alike among professional growers and applied scientists, has avoided the temptation to ride two or more mounts and so has succeeded in keeping his seat while negotiating some awkward fences. The round is not faultless—the field is far too large for that—but the author has been well served by his printer and very few errors have been detected. One or two chemicals have been, surprisingly, wrongly named. Thus CMU (p. 35) should read parachlorophenyl-dimethyl-urea, and the last mite ovicide mentioned on p. 84 (lines 8 and 9) should be parachlorophenyl parachlorobenzyl sulphide.

Unfortunately, Dr. Holmes has not defined his use of percentage for the strength of a pesticide, and this may well lead to confusion in the mind of the "average grower". Thus (p. 76) parathion is quoted for use at 0·005% and BHC at 0·1%; undoubtedly the parathion is quoted by active ingredient, i.e. actual parathion (diethyl paranitrophenyl thionophosphate), but the figure for BHC refers to the crude mixture of isomers of which only 13% is active ingredient, i.e. gamma-BHC. This inconsistency is also hidden by the absence of any reference to the recommended common names for pest control chemicals issued by the British Standards Institution as B.S. 1831, which distinguishes BHC from gamma-BHC.

Even a chemist may beg leave to doubt if "every grower must follow a spraying programme . . . undertaken annually" (p. 72); some pests only require chemical attack every two or three or even more years, and regular spraying may be one way to produce "resistant strains". Whether "resistant strains" of fruit tree red spider mite have been induced in Britain by parathion is much more debatable than the author suggests, and it is hard to reconcile his views on the role of beneficial, especially predatory, species with those of eminent entomologists in Britain and elsewhere.

The author has made a notable attempt to cover the entire field of chemical crop protection and the book can be recommended as an introduction to the subject to all interested in growing plants for whatever purpose. A.H.M.K.

3378. Institute of Agricultural Economics, Poland.
The Polish countryside in figures.
"Polonia" Foreign Language Publishing House, Warsaw, 3rd abridged edition, 1954, 8×6 in., pp. 275.

The authors of this pleasantly readable book with its 22-page list of contents are not troubled by nuances in grey. Everything was black under the old capitalist slavery and now it is all white under the present beneficent dispensation—after all the figures show it. Mercifully references to horticulture are meagre and are restricted to vegetable and fruit cultivation on state farms. As regards fruit on these farms it is cheering to note that numbers, acreage, etc., have all gone up between 1951 and 1952. Vegetable figures cover 4 years and as regards the area under cultivation on state farms are equally gratifying, rising from 2·3 thousand ha. in 1949 to 10·9 in 1952. There may be much truth both in figures and facts, but the latter are so larded with platitudes as to make a naturally cautious reader suspicious. D.A.

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* Professor of Soils, Clemson agric. Coll., S. Carolina.

3379. KNOTT, J. E.
Vegetable growing.
Henry Kimpton, London, 5th edition, 1955,
9½×6 in., pp. 358, bibls, illus., 37s. 6d.

This authoritative American textbook has been considerably revised since the last edition in 1949 [see *H.A.*, 19: 3531]. Information on new developments in the field of soil conditioners, herbicides, insecticides and other chemicals has been added to bring the text up to date; many recent references have been added to the bibliographies, while some earlier ones have been omitted. The lay-out has been somewhat improved by dividing the book into 3 parts, i.e. General considerations, Cool season crops and Warm season crops, although there is little change in the actual arrangement and the only additional crop dealt with is roselle. There are 7 new illustrations and a list of addresses of research centres in the U.S.A. from which publications or information may be obtained. P.R.-D.

3380. LAL, K. N., AND SUBBA RAO, M. S.
Micro-element nutrition of plants.
Banaras Hindu University Press, India,
1954, 10×6½ in., pp. viii+246, bibls
numerous, Rs. 20/–.

This is an attempt at surveying the whole field of micro-element nutrition of plants, the work of over a thousand authors being reviewed. Chapters are devoted to deficiency symptoms of boron, manganese, copper, zinc and molybdenum, only brief mention being made of those of iron, and to toxicity symptoms of these and other elements. Another chapter is devoted to the effects of such factors as soil characters, agronomic conditions and climate on micro-element nutrition. Two chapters are concerned with the interrelation of nutrient elements, both micro- and macro-. These are followed by a consideration of the effects of micro-elements on growth; then a whole chapter is given up to their effects on the organic composition of plants, and finally their effects on plant metabolism and their functions in plant life are discussed. W.A.R.

3381. LEVITT, J.
Plant physiology.
Prentice-Hall, New York, 1954, 9×6 in.,
pp. 172, bibls, illus., 40s.

This book has no pretensions—it is what it sets out to be, an elementary course in plant physiology for students with varied backgrounds, and its consequent limitations are clearly indicated by the author. When the reviewer took on this assignment it was with reluctance to spend time on another insipid "re-hash" of more substantial fare—this state of mind, however, quickly changed to pleasure at finding instead that the dish before him was in fact "hors-d'oeuvres variés".

The twenty chapters of the book are grouped into four parts: Introduction; Plant Biophysics and Biophysical Chemistry; Plant Biochemistry; Growth. These divisions themselves suggest a somewhat different outlook from the usual one found in physiology textbooks, and, while perhaps too much space is devoted to the plain physics and chemistry of topics such as pH, adsorption, colloids, diffusion, and so on, it is nevertheless a salutary reminder to many biologists that "living" processes must conform to physical and chemical "laws", and that theories of plant behaviour must ultimately be propounded in such terms.

Most of the illustrations and tables are apt, though with only two photographic plates in the book it is a pity that one should be a meaningless electron micrograph of mitochondria. The index is rather too complete for a book of this kind, in that it suggests that it may be a "reference work", whereas it is primarily for *reading*—for example, the reviewer could recall no mention of the fungus when chancing upon the item "Dry rot" in the index; this was actually a mere example of boron deficiency in sugar beet.

Layout is good, type clear, and errors very few—in fact only two minor ones were noticed. Altogether, indeed, it is a pleasant and refreshing book to read—several times for the beginner, and at least once even for the old hand. H.W.B.B.

3382. PAPADAKIS, J.
Agricultural geography of the world. (Climate, growth rate and rhythm, vegetation, soils, crops, agricultural regions.)
J. Papadakis, Nahuel Huapí 4984, Buenos
Aires, Argentina, 1952, 10½×7 in., pp. 131,
bibl. 180.

Chapter I (13 pp.) summarizes the effect of environment on plant growth. Chapter II (17 pp.) gives an ecological classification of crops. Crops are first classified according to their life cycles and broad temperature requirements, namely annual (winter, summer and midseason) and pluriannual (cryophilous or requiring chilling, and tropical); and then according to special ecological characters such as frost resistance, photoperiodic requirements and drought resistance. In Chapter III (12 pp.) climates are classified according to crop ecology on the basis of the 4 factors of winter severity, summer duration and heat, humidity conditions, and seasonal distribution of humidity. There is a map of the agricultural zones and climates of the world and 2 plates show the annual variation of mean daily temperatures and the durations of thermal seasons at 19 stations in various parts of the world, and the annual variation of the humidity index at 58 stations. In Chapter IV (11 pp.) natural vegetation is discussed with special reference to growth rate and rhythm and a growth index is formulated. A plate gives the growth indexes of 70 stations and maps show the vegetation and plant growth rates and rhythms throughout the world. Chapter V (23 pp.) concerns soil formation and geography and there is a soil map of the world. Chapter VI (36 pp.) is devoted to the agricultural regions of the world. The world is divided into 11 great zones which in turn are subdivided into agricultural regions ranging in number from 18 in the Southern South America zone to 4 in the Western Europe zone. On the maps and plates, separate copies of which are obtainable from the author-publisher, references are given in English, Spanish and French. The book is provided with subject, soil, crop, geographical and author indexes.

The subdivisions of the world into agricultural regions is somewhat unequal as a few examples will show. New Zealand and Tasmania are treated as a single region while California is divided into no less than 4. The Western Europe zone contains the same number of regions as California. The whole Eastern Asia zone is divided into only 7 regions. Some inequality of treatment is inevitable owing to the paucity of published information about some parts of the world, but an examination of the bibliography suggests that the author did not make full use of the available literature. Even if his own papers are not taken into account he cites about twice as many references from the New World as from the Old. The North American references are scarcely exceeded in number by those of the whole of the rest of the world put together, and themselves exceed those of the British Commonwealth by about 5 times. There appears to be only one Russian reference.

But to steer a perfect course between the Scylla of a pullulation of petty regions and the Charybdis of oversimplification in the preparation of a general work of this sort undoubtedly calls for a master's certificate and to satisfy all the denizens of all the agricultural regions of the 11 zones would call for a wisdom and judgment beyond Solomon's. The approach adopted in this book should be of much interest to students of agricultural geography, vegetation, soils and climates. J.D.

3383. Shoemaker, J. S.
Small-fruit culture.
McGraw-Hill, New York, Toronto, London, 3rd edition, 1955, 9×6 in., pp. 447, bibl. 621, illus., $ 6.50 or 49s.

The total value of the crops of small fruits in North America has been estimated at some 200 million dollars. They are grown on about one million acres, of which grapes occupy more than half the total area, strawberries about a quarter and raspberries, blackberries and hybrid berries only about one-tenth. It is not surprising, therefore, to find that Shoemaker devotes three-quarters of this book to these fruits and gives relatively little space to currants, gooseberries, blueberries and cranberries.

This book has been accepted as a standard textbook by almost a generation of students and growers. Those who are familiar with the second edition [*H.A.*, 18: 3112] will scarcely recognize the layout and appearance of the new edition. The type has been completely re-set to great advantage, better use being made of space and bold type to break up the text. It is now much easier to read and the clear cross headings facilitate the rapid location of desired items of information. The opportunity has been taken to revise thoroughly and add to the text, including notable additions on irrigation, weed control, training methods, virus diseases, picking machines and new varieties. Shoemaker has always blended together the accepted cultural practices and the contributions of scientific research, and the 621 references to published work, which incidentally are all erroneously grouped under the heading Cranberry culture, include some 200 new publications, of which more than 100 have appeared since 1950. Many of the older references to work that had become outdated have been omitted, thus keeping the list within reasonable proportions. European readers may, however, be disappointed to find few references to work on this side of the Atlantic.

This book is full of sound advice and good ideas that are applicable in many parts of the world, and it should also serve as a practical background for the study of research literature from Canada and the U.S.A. on small fruits. H.B.S.M.

3384. Singh, L. B., and Singh, U. P.
The litchi.
Superintendent, Printing and Stationery, Lucknow, U.P., 1954, 9½×6½ in., pp. 87, bibl. 65, illus.

It is difficult to explain why a fruit of such undoubted merit as the litchi has not been more widely grown outside its original home, China. As the authors of this monograph point out, India, the second largest producer, has less than 24,000 acres of litchis, a mere 0·75% of the total fruit acreage in that country. It may be that the lack of books on the tree, other than those published in Chinese, which are not likely to be of much use to most of us, has contributed to the limited amount of interest shown in the past, and if this is so the appearance of this monograph may well encourage more rapid expansion in the future.

In this book the two Singhs, who are, respectively, Head and Assistant Botanist of the Horticultural Research Station, Saharanpur, have supplemented a review of the literature with their own observations and experimental results. Following a short chapter on the history of the fruit they describe its growth habits and morphology, its propagation, mainly by marcotting, and its climatic and soil requirements. Cultural practices are dealt with rather sketchily, such information as is available being mainly empirical, and methods of preservation and storage are likewise touched on briefly. Pests and diseases are dismissed in 4 pages, but here the reason is not so much lack of information as lack of pests and diseases. By contrast, the final chapter, on the classification and description of varieties, occupies nearly two-thirds of the book, and the authors describe 12 local varieties in great detail, supplemented by coloured plates of the fruits and a general key to their identification. These varieties bear Indian or English names and whether any of them are synonyms of old Chinese varieties is unknown. In any event it is perhaps as well that they should be rechristened, because translations of some of the Chinese names would seem a little odd on the greengrocer's counter; among the happier names is "Imperial concubine's laugh", but the customer's reaction to "President of a board embraces" would be doubtful and his response to "Glutinous rice" would almost certainly be disappointing.

The reviewer used to buy litchis in a small shop in his county town before the war, but has not seen them since. He selfishly hopes that this book will arouse sufficient interest to stimulate production and research and so once again make this delectable fruit available in the county towns of England. G.K.A.

Annuals and reports.

3385. Almindelig Dansk Gartnerforening (Danvig, A. M., and Pedersen, K.).
Årbog for Gartneri 1954 **(Horticultural Yearbook 1954).**
S. L. Møllers Bogtrykkeri, Copenhagen, 1955, pp. 297, Kr. 5.

The first part of the Yearbook (pp. 7-141) once again provides a very comprehensive directory of Danish horticulture, including horticultural research and statistics, to which a detailed list of vegetable varieties and strains recognized for 1955 has been added as a new feature. Reports of small-scale trials carried out by commercial growers under the auspices of the Danish Market Gardening Association make up the second part. Abstracts of some of these papers will be found earlier in this number of *H.A.*

3386. Colonial Research Council.
Annual Report of Colonial Research for 1953-1954, 1954, pp. 278, H.M. Stationery Office, London, 7s. 6d.

Colonial Products Council. Vegetable insecticides and drugs: pyrethins, papain, aloin, icterogenin from *Lippia rehmanni*, quinovic acid from *Cinchona* and *Mitragyna* bark, phyllanthol from *Phyllanthus engleri*, lantadenes from *Lantana camara*, glycyrrhetic acid from *Dioscorea hispida.* Tobacco: from Northern Rhodesia, Tanganyika and Gold Coast. Essential oils: sage, safrole from *Cinnamomum* spp., muhuhu oil from *Brachylaena hutchinsii*, oleoresin from *Pinus caribaea*, eugenol. Spices: black pepper, pimento. Vegetable fibres. Tanning materials: *Anogeissus schimperi*, mangrove. Oil seeds: conophor from *Tetracarpidium conophorum*, illipe kernels, avocado pear oil, shea nut butter. Wax: sugar cane. Foods: tea, coffee, cacao. Fruit: dried pineapple, limes. *Committee for Colonial Agricultural, Animal Health and Forestry Research.* The chief horticultural and plantation crops on which research is being conducted in various parts of the world are cacao, oil palms, bananas, sugar cane, coconuts, coffee, pineapples, tea, tobacco, citrus, sisal, tung and cloves. *Colonial Insecticides, Fungicides and Herbicides Committee.** Studies included defoliants and the process of leaf abscission, pests of cacao, pineapples, coffee, tobacco, coconuts and sugar cane, and diseases of tea and bananas.

3387. Commercial Grower.
The Commercial Grower Year Book and Diary, 1955.
Benn Bros., Fleet Street, London, 1955, 8×6 in., pp. 261, 10s. 6d.

To those wanting condensed information on any of the following subjects, in so far as they relate to British horticulture, this reference book will be most useful: Growers' and allied associations, official bodies, N.F.U. organization, the N.A.A.S., training establishments, fruit varieties, pollination tables, methods of planting fruit, vegetables and flowers, manures, insecticides and fungicides, fruit and vegetable grades and containers, and crop acreages. There is also a very full list of manufacturers of horticultural machinery, equipment and chemicals.

3388. Council for the Promotion of Field Studies.
C.P.F.S. Annual Report 1953-54, 1955, pp. 60, Balfour House, 119/125 Finsbury Pavement, London, E.C.2.

The report includes an account by L. N. Staniland of a course on biological illustration held at Flatford Mill in August, 1954. The methods taught were line drawing, glass-tracing, scraper-board and splatter-work.

3389. Directie van de Landbouw, The Hague.
Tuinbouwgids 1955. **(Horticultural guide for the Netherlands 1955.)**
The Hague, Netherlands, 1955, 9×6 in., pp. 806, illus., fl. 6.

The horticultural guide, now in its twelfth year, has been once more brought up to date. In this issue there are further additions to the series of coloured plates of pest and disease injury to horticultural crops. [For further details of the coverage of this comprehensive yearbook see *H.A.*, 25: 2291 and 2292.]

3390. Geisenheim (Steinberg, J.).
Lehr- und Forschungsanstalt für Wein-, Obst- und Gartenbau, Geisenheim am Rhein. Bericht für das Rechnungsjahr 1953/54. **(Annual Report of the Geisenheim Horticultural College and Research Station for 1953/54)**, pp. 86, bibls numerous.

Among investigations reported are: *Department of Botany and Fermentation:* Pollination of hazel nut, walnut, plum, sweet and acid cherry, pear and apple; studies of the flower pigment pelargonidin in primula and aster; the chemical differentiation between dominant and recessive white flower colour in iris. *Department of Plant Diseases:* Nutritional deficiencies in vines and vegetables studied in soilless culture; fungal sources of antibiotics. *Department of Soil Science and Plant Nutrition:* Peat media for *Erica gracilis* and *Azalea indica*; tests with proprietary fertilizers on vegetables, fruit trees and vines; responses of *Statice tatarica* to potassium. *Department of Vine Breeding and Propagation:* Rootstock tests for phylloxera resistance; growth substance treatment of vine seedlings; the protection of graft unions with proprietary waxes; X-ray studies of graft unions. See also abstract 2544. *Department of Viticulture and Wine Making:* Manurial, spacing, rootstock and clone trials; testing of spray apparatus. *Department of Fruit Growing:* Selection of *Juglans nigra* seedlings as walnut rootstocks, walnut grafting; cover crops for orchards. *Department of Horticulture:* Varietal trials with flowers grown under glass and in the field. *Agrometeorological Institute:* Dew and hoarfrost measurement; soil moisture measurement in frozen soil; microclimates in hot frames.

3391. Indian Council of Agricultural Research.
Annual Report of the Indian Council of Agricultural Research for 1952-1953, 1954, pp. 189, Government of India Press, Calcutta, Rs. 3/6/– or 5s. 6d.

Progress reports of research work on horticultural crops include the following items: *Insect pests and plant diseases:* Mango and pumpkin pests; virus diseases of *Datura*, papaw, eggplant and cucurbits. *Fruits:* Mango classification of varieties according to vigour, deblossoming by sprays, and breeding; citrus rootstock-scion relationships; banana variety studies; vine breeding; guava air-layering by a new soil and waterless method and breeding for seedlessness; papaw variety and processing studies. *Vegetables:* Varietal studies on tomato, eggplant, bhindi and other Indian vegetables.

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* Also issued as a separate publication.

Spices and condiments: Cardamon seed disinfection and germination, diseases and pests and breeding; turmeric seed germination, varieties and drying; coriander wilt disease caused by *Fusarium oxysporum*; ginger varieties; pepper (*Piper*) flower biology and fruit set.

3392. INSTITUT NATIONAL DE LA RECHERCHE AGRONOMIQUE.
Travaux effectués par les Stations agronomiques en 1953. (**The work of the [French] Agronomic Stations in 1953.**)
Ann. agron., 1954, **5**: 653-927.

The report (1) briefly summarizes results obtained at French Agronomic Stations and already published elsewhere, (2) notes projects under investigation and (3) gives progress reports of long-term experiments. Separate abstracts have been made of the latter, in so far as they are of horticultural interest and provide preliminary conclusions.

3393. THE MACAULAY INSTITUTE FOR SOIL RESEARCH.
Annual Report of the Macaulay Institute for Soil Research for 1953/54, Craigiebuckler, Aberdeen, pp. 55, illus.

The Plant Physiology Section (pp. 33-6) reports work on phosphate absorption, sterile culture of roots, nickel toxicity and radioactive studies.

3394. MELFORT (WILSON, H. E.).
Progress Report of the Melfort Experimental Station, Melfort, Saskatchewan, 1947-1953, 1955, pp. 57, illus.

Horticulture (R. H. Anderson, pp. 37-42). Varieties of apple, crabapple, plum, cherry, gooseberry, red and white currant, black currant, strawberry, raspberry, ornamental shrubs, flowers, lawn grasses and vegetables that have proved hardy and desirable in other ways are listed.

3395. MISSISSIPPI.
67th Annual Report of the Mississippi Agricultural Experiment Station for the fiscal year ending June 30, 1954, pp. 127, illus., also printed in *Miss. Fm Res.*, 1954, Vol. **17**, Nos. 7-10.

Sections of the report which are of direct horticultural interest include: *Horticulture Dep.* Breeding, selection and variety tests with small and top fruit, ornamentals and vegetables. Peaches receiving continuous chilling in winter began to grow earlier and developed more normally than those which received alternating periods of high and low temperatures, even though the total number of hours of chilling was the same. Camellias: hardiness, grafting and packing. Pot chrysanthemums: pinching the cuttings 5–6 days after potting resulted in better quality flowers than pinching at the time of potting. Vegetable seed: among several chemicals tested, quick lime in combination with a desiccant had a significantly beneficial effect on the storage quality of water melon, tomato, pepper and cow pea seed. Tomatoes: cracked fruit kept slightly better when dipped in 5% Orthocide 50 before storage. *Entomology Dep.* Fruit: a combination of lead arsenate and DDT proved effective against peach pests. Toxaphene gave poor control of oriental fruit moth but good control of plum curculio. Ornamentals: the best control of cyclamen mite on verbena and African violets was given by dips of parathion w.p. 1 lb./100 gal. or toxaphene emulsifiable concentrate 1 qt/100 gal.; control of red spider on roses in 10-inch pots was obtained by soil treatment with schradan or demeton, provided 4 oz. of the diluted insecticide was applied per pot; for control of tea scale on camellias, parathion w.p., parathion emulsion, malathion w.p. and methyl parathion showed promise and were less phytotoxic than refined oil. *Plant Pathology Dep.* Vegetables: breeding and selection of bell peppers for resistance to tobacco mosaic and nematodes. Ornamentals: studies on verticillium wilt of chrysanthemums, dieback and root rot of camellias and petal blight of azaleas. Melons: breeding of disease resistant water melons and cantaloupes. *Chemistry Dep.* Nitrogen had more effect on the composition of collards than lime, the greatest effect being on carotene and protein content. Irrigation of turnip greens increased their carotene and P contents but had no effect on their Ca and N contents. *Delta Branch Station.* Weed control: CMP and Karmex D-L applied pre-emergence to spinach and dinitro applied pre-planting gave fair weed control and greatly increased yields; dinitro applied pre-emergence resulted in complete loss of crop. *Coastal Plain Branch Station.* Sugar cane: C.P. 36/111 was the most desirable variety for syrup production. Cucumbers: a 1 ft spacing and a 16-64-64 fertility level proved the most productive. *Truck Crops Branch Station.* Liming of acid soils (pH 4·9–5·2) significantly decreased the incidence of blossom end rot of tomatoes, particularly under glass; pH (ranging from 5·6 to 7·2) had little or no effect on marketable yield of cabbage and lettuce; the incidence of blossom end rot was twice as high in staked and pruned tomatoes as in unstaked plants; selection was carried out for blackrot resistance in brassicas. *South Mississippi Branch Station.* Vegetables: tomato and cabbage variety trials. Tung: mechanical harvester developed; young trees should receive a 5-10-5 fertilizer at the rate of 1 lb. per tree per year of age; bearing trees should receive a 12-6-12 fertilizer at a similar rate. Sugar cane: variety studies. *Weed Control Section.* Dalapon was more inhibitory to Johnson grass than TCA or sodium chlorate, alone or combined. The inhibitory action of maleic hydrazide on wild onion was more pronounced on root than on shoot growth. The behaviour of herbicides in the soil was studied.

3396. NAALDWIJK.
Jaarverslag over 1954 van het Proefstation voor de Groenten- en Fruitteelt onder Glas te Naaldwijk. (**Annual Report for 1954 of the Research Station for Fruit and Vegetable Growing under Glass, Naaldwijk**), 1954, pp. 78.

Manurial trials were continued with grapes, peaches, tomatoes, lettuces and cauliflowers, and *Cultural experiments* with flowers, grapes, tomatoes, lettuces and cucumbers. *Physiological research* concerned endive vernalization, tomato root development, the application of sugar solutions to tomato, cucumber and strawberry leaves, and short-day treatment of chrysanthemums. *Growth hormone experiments* concerned fruit setting of tomatoes, melons, strawberries and plums under glass, and storage of tomato and grape pollen. *Breeding and selection* was carried out on grapes, peaches, plums, calceolarias, cinerarias and lettuces, and *Variety trials* on tomatoes, egg plants, cauliflowers, scorzonera, melons, beans and sprouts. *Storage and packing trials* were made on cauliflowers, grapes, melons and tomatoes. *Pest, disease and weed control experiments* were also made on various crops. [See also separate abstracts.]

3397. NAUDE, T. J.
Entomology. [Forming part of the Annual Report of the Secretary for Agriculture, Union of South Africa, for the year ending 31 August, 1954.]
Fmg S. Afr., 1955, **30**: 116-20.

This survey of work done in 1953/54 by the Division of Entomology, South Africa, includes the following: insecticides, biological control of insects, and methods of controlling pests of citrus, pineapples, tobacco and deciduous fruits.

3398. NIGERIA.
Annual Report on the Department of Agriculture, Federation of Nigeria (Central), for the year 1952-53, Part II, 1955, pp. 47, 9d.

This report includes information on: *Cacao soil survey:* of Western Region. *Botany:* tobacco variety trials, cacao spacing and variety trials, kola selection, hevea clonal collection, citrus rootstock trial, cacao black pod disease control, introduction of new sugar cane varieties. *Entomology:* beetles causing shot-hole in cacao and capsid studies.

3399. NORTH DAKOTA (GEISZLER, G. N.)
Results of nine years of crop experiments on the North Central Agricultural Experiment Station.
Bull. N. Dak. agric. Exp. Stat. **389,** 1954, pp. 59, illus.

The North Central branch of the North Dakota Agricultural Experiment Station was established at Minot in 1945. The report, which covers the first 9 years of the Station's work, includes notes on the fruit varieties and ornamental trees and shrubs planted.

3400. NYASALAND.
Annual Report of the Department of Agriculture for the year 1953/54 (Part II), 1955, pp. 64, 4s. 6d.

Dark, Burley and flue-cured tobacco: Varietal studies, fertilizer and cultural trials, rotations. *Tung:* Budlings *vs* seedlings, clonal trials, intercropping and cover crops, fertilizers, biennial bearing. *Coffee:* Arabica cultivation experiment (mulch and shade) and variety trial and robusta manurial trial. *Fruit:* Tung Station: temperate and tropical fruit and nut trees, vines, youngberries, strawberries. Mwera Hill Experiment Station: temperate fruit and nut trees, vines, citrus and orchard cover crops. *Agricultural chemist:* Effect of shade on tea, *Grevillea vs Albizzia*, and tung leaf analysis. *Tea:* Nursery establishment, pruning, tipping, plucking, manuring, spacing, weeding and shading. [See separate abstracts on tobacco, tung and tea.]

3401. PURDUE UNIVERSITY.
Progress of Agricultural Research in Indiana, being *67th Annual Report of the Director, Purdue University Agricultural Experiment Station, Lafayette, Indiana, for the year ending June 30, 1954,* pp. 142, illus.

Horticultural Crops. Apple: breeding scab-resistant varieties, fruit setting hormone studies, rootstock trials, fertilizer and herbicide trials in nurseries. Tomato: breeding wilt- and leafspot-resistant varieties, pollination. Breeding other vegetables. *Herbicides and fungicides.* Spray materials and apparatus tests. Tests of fungicides for tomatoes. Tests of herbicides on other vegetables. *Insect and rodent control.* Radish and turnip maggots. Mint oil contamination by insecticides. Oystershell scale (*Lepidosaphes ulmi*). Euonymus scale (*Unaspis euonymi*). Juniper scale (*Diaspis carueli*). Tests of newer insecticides. *Basic science and agriculture.* Vernalization and fruit set studies. Radioisotope accumulation studies on tomato and peppermint using Ca, P, S, K, Co, Cu, I, Fe, Mo, Se, Na and Zn. Tomato: uptake of alternaric acid, breeding for high vitamin C and A contents.

3402. SCOTLAND, DEPARTMENT OF AGRICULTURE.
Agricultural Statistics 1953. Scotland.
1955, pp. 93, H.M. Stationery Office, Edinburgh, 4s. 6d.

Part I deals with acreages, yields and production of crops, including vegetables, small fruits, orchards, glasshouses and frames, for 1953. Part II deals with prices, output and value of agricultural produce for the same year.

3403. SCOTTISH HORTICULTURAL RESEARCH INSTITUTE.
First Annual Report 1953-1954, 1954, pp. 28.

The Scottish Horticultural Research Institute became legally established as a self-governing, grant-aided research organization on 1 April, 1953. It consists of the Research Institute at Mylnefield, Invergowrie, which grew out of the Scottish Raspberry Investigation, and the West of Scotland Unit at Auchincruive, Ayr. A short historical survey is given of its origin and development. Work on the following subjects is being carried out: *Plant Pathology:* hosts and transmission of raspberry leaf curl; susceptibility of raspberry varieties to vein-banding; production of virus-free raspberries. *Horticultural Botany:* raspberry cultivation experiments; raspberry breeding to combine high yields with improved fruit quality; studies with strawberries on (*a*) the seasonal cycle of flower and stolon production in spring-flowering and perpetual varieties, (*b*) the incidence and symptomatology of "June yellows" in Climax and its effect on yield, and (*c*) the field performance of stocks and selections of Royal Sovereign and Climax; apple and plum variety-rootstock trials; fruit variety trials with raspberries, black currants, strawberries, and plums; vegetable trials and breeding to select varieties suitable for growing under Scottish conditions. *West of Scotland Unit:* techniques for supplementing field testing of red-core in strawberries by bench testing; strawberry breeding for red-core resistance; studies on degeneration in some Climax stocks; raspberry breeding to produce a variety giving yields comparable to the local Burnetholm Seedling.

3404. Slabber, M. H.
Winter-rainfall region. [Forming part of the Annual Report of the Secretary for Agriculture, Union of South Africa, for the year ending 31 August, 1954.]
Fmg S. Afr., 1955, **30**: 169-73.

The report of the Stellenbosch-Elsenburg College of Agriculture on education, advisory work and research in the winter-rainfall region includes notes on vine selection and propagation, vegetable pests and diseases, and vegetable variety trials.

3405. Tanganyika.
Annual Report of the Government Chemist, Tanganyika, 1954, 1955, pp. 9, 1s.

Studies included: (1) coffee black tip (and dieback) disease at Mbosi and leaf yellowing/mottling at Babati; (2) the practical problems of foliar nutrition (especially with Ca) of coffee; and (3) the effects of Ca, S, P and Mo on dieback in young wattle at Njombe.

3406. Trinidad and Tobago.
Administration Report of the Director of Agriculture, Trinidad and Tobago, for 1953, 1954, pp. 70, 72c.

Cacao: clonal and fertilizer trials, breeding and selection of witches' broom resistant clones. *Sugar cane:* variety trials, ratoon stunting and chlorotic streak diseases. *Citrus:* fertilizer and cover crop, rootstock and management, transplanting, and tree management trials, and lime dying-out disease and wither-tip resistance studies.

3407. Tunisie, Service Botanique et Agronomique.
Rapport sur les Travaux de Recherche effectués en 1954. **(Report on research work conducted in Tunisia in 1954)**, pp. 180 (cyclostyled).

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